1. USE

■ 1.1 General

Using KNX/BUS communicate with other KNX devices. Database need to be downloaded to the Fan Coil Unit Controller by using ETS (ETS3 and above). The document descript how to use the products. Our products use standard according to EMC, electrical safety, environmental conditions.
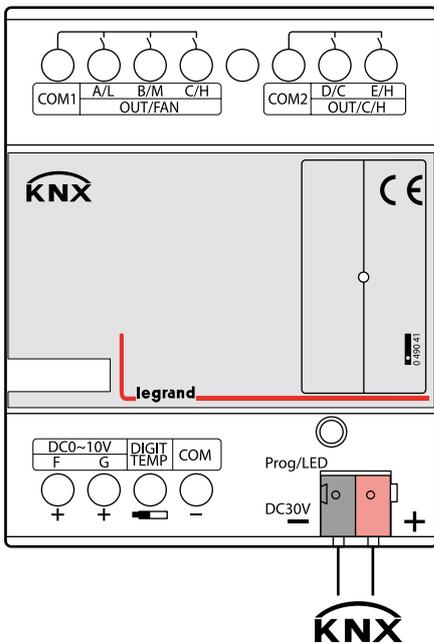
The Fan Coil Unit Controller is used to control fan coil units (heating and cooling terminal units), floor heating or switch actuators. They are installed in the room and supplied via a central heating and cooling system. The room temperature can be very quickly adapted to individual requirements using this system.

The applications described in the following enable the control of

- Fans
- Blowers
- Fan coil units
- Valves for heating or cooling
- Electrical loads

The outputs which are not required for the fans, blowers and fan coilfunctions can be used as switch actuators for switching electrical loads or as heating actuators for controlling valves.

■ 1.2 Product Function

The Fan Coil Unit Controller is used to control fan coil units, floor heating or switch actuators. Depending on the design of the device, fan coil units are used in 2-pipe systems (heating only, cooling only, or heating and cooling via a common piping system) or alternatively in 4-pipe systems (heating and cooling via separate pipes).It controls up to 3 fan speeds (Relay or 0-10V outputs) as well as heating or cooling valves (Proportional or electrothermal valve) respectively. The mode of control is based on two-step control or a time-discrete PI controller with setpoint / actual value comparison. The valves and the fan can be regulated directly by devices via the closed loop of this controller. When the Fan Coil Unit Controller is used in floor heating, it is the maximum control seven channel output respectively. All of the floor heating channel control is used a time-discrete PI controller with setpoint / actual value comparison.

Preferably use comfort, standby and building protection modes.

Note:

Switching directly from "night" mode to "comfort" mode can not be done permanently, only temporarily via a "comfort extension" time delay, after which you will go back to "night" mode automatically.

1. GENERAL (continued)

■ 1.1 Product Function (continued)

The following functions can be set in different functions:

1-Five channel 10A relay outputs

2-Two channel 0-10V DC outputs

3-Fan speed: High, Medium, Low

4-HVAC working mode: Heating, Cooling

5-HVAC operation mode: Standby mode, Comfort mode, Night mode, Frost protection

6-Fan speed and Valve status report

7-Seven local temperature sampling

8-BUS temperature sampling

9-Local temperature report

10-Seven channel floor heating outputs

11-Five control mode each floor heating channel

12-Seven channel output independently

13-Channel statistics total ON time

14-Channel state response

15-Channel state after bus voltage failure and recovery

16-Staircase light

17-Delay

18- PWM control output

2. HARDWARE

The technical properties of KNX

Fan coil controls as following sections.

■ 2.1 Technical data

Power supply

• Operating voltage (supply by the bus)	21...30 V DC
• Current consumption KNX (operate)	< 20 mA
• Current consumption KNX (standby)	< 5 mA
• Power consumption KNX (operate)	< 600 mW
• Power consumption KNX (standby)	< 150 mW

Output nominal values

• Number of contacts	5 relay and 2 channel 0-10v
•In rated current	Relay 10 A and 0-10v 5mA
• Power loss per device at max. load	3.3 W
• Unrated voltage	250/440V AC (50/60 Hz)

Output switching life expectancy

• Mechanical Life	> 1 000 000
• Electrical Life (240 V/cos = 0.8)	> 100 000

Connections

• KNX	Bus Connection Terminal0.8 mm Ø, single core
• Load circuits	Screw terminal with Slotted head 0.2...4 mm² multi- core + 0.4...6 mm² single-core
• Cable shoe	12 mm
• Tightening torque	Max. 0.8 Nm

Temperature input

• Local temperature sensor	max. 7 sensor Cable length max. 50 m
• Via KNX	One or two object

CONTENTS

2. HARDWARE (continued)

■ 2.1 Technical data (continued)

Operating and display
- Red LED and KNX program button for assignment of the physical address.
- Green LED flashing on the KNX program button is read back the local temperature.
- Green LED flashing on the top shell show that the device is working. Note: Press the KNX program button 3 seconds to refresh the local temperature sensor.

Temperature range
- Operation   – 5 °C ~ + 45 °C
- Storage   – 25 °C ~ + 55 °C
- Transport   – 25 °C ~ + 70 °C

Environment conditions
- humidity   max. 95 % Non-condensing

Appearance design
- Modular   DIN-Rail Modular installation
- Dimensions (H x W x D) 90 mm x 72 mm x 64 mm

Weight (unit kg)   0.26

Installation   Use 35 mm mounting rail

Mounting position   Electric switch box

Material and Colour   Plastic, White

Standard and Safety   Certificated
- LVD Standard   EN60669-2-1
- EMC Standard   EN50491-5-1, EN50491-5-2

CE mark
- In accordance with the EMC guideline and low voltage guideline

Pollutant   Comply with RoHS 2

Application table

Type	Max. number of Communication Objects	Max. number of Group Address	Max. number of Association
0 490 41	230	254	254

Note:
The programming requires the KNX Software Tools ETS (ETS3 and above).

2. HARDWARE (continued)

■ 2.2 Dimension drawings
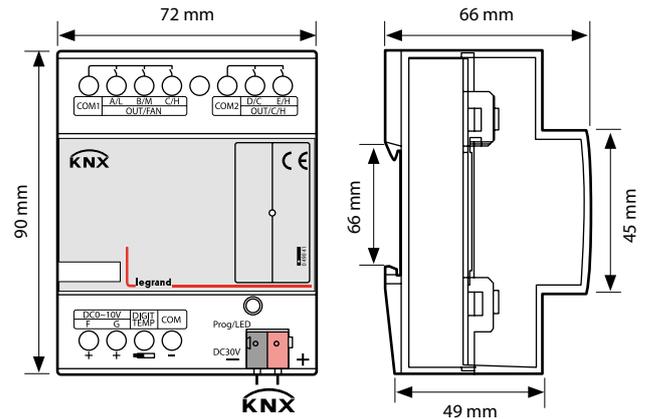
■ 2.3 Wiring diagram
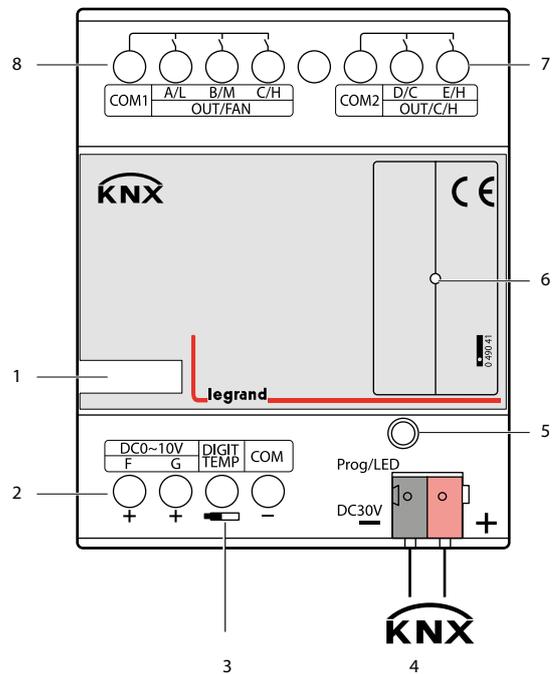
1 - Label area
2 - Channel F, G output DC 0-10 voltage 10 mA max./outputs
3 - Optional temperature sensor
4 - KNX interface
5 - Programming button Red programming LED Green Local temperature LED
6 - Green working LED
7 - Channel D, E (Heating/Cooling/Relay output) 10 A max./outputs
8 - Channel A, B, C (Fan speed or Relay output) 10 A max./outputs

2. HARDWARE (continued)

■ **2.3 Wiring diagram (continued)**

• **Examples for applicaton**

Different configuration corresponding different wiring diagram

-- **Fan coil units:**

2. HARDWARE (continued)

■ **2.3 Wiring diagram (continued)**

• **Examples for applicaton (continued)**

2. HARDWARE (continued)

■ 2.3 Wiring diagram (continued)

• **Examples for applicaton (continued)**

-- **Floor heating and switch actuators:**

Note:

a) Dimensions of the space to be provided for each device.

b) Dimensions and position of the means for supporting and fixing the DMX Recorder within this space

c) Minimum clearance between the various parts of the DMX Recorder and the surrounding parts where fitted

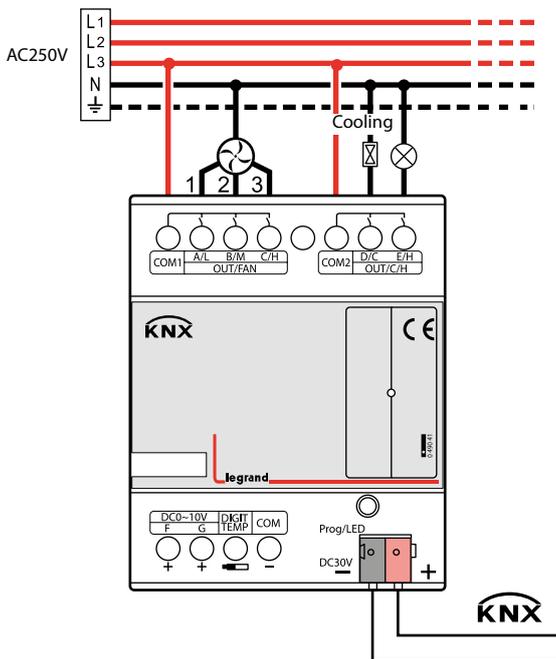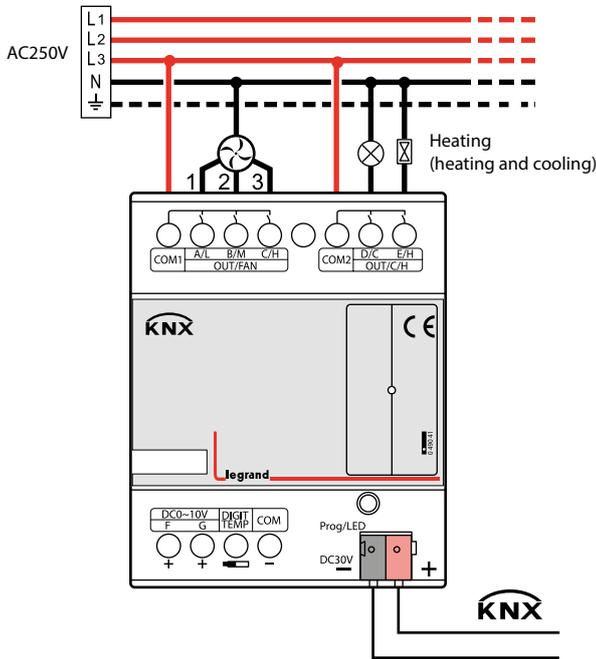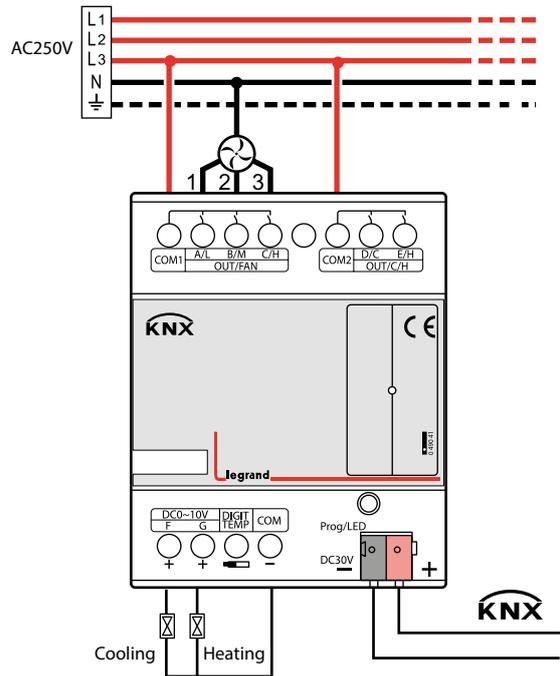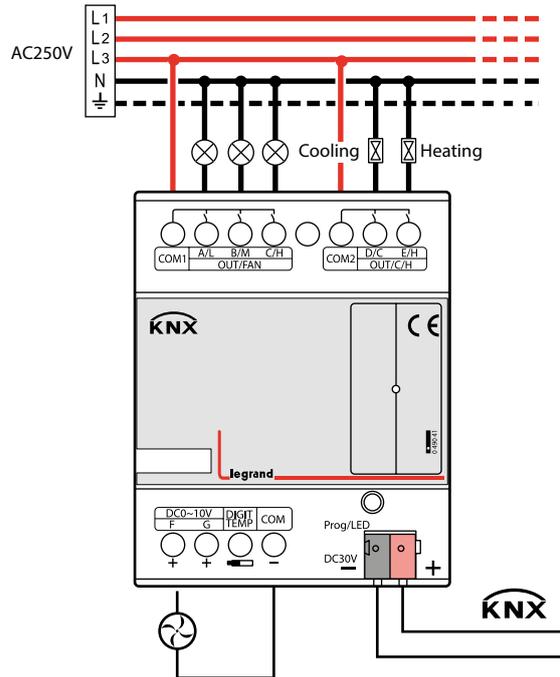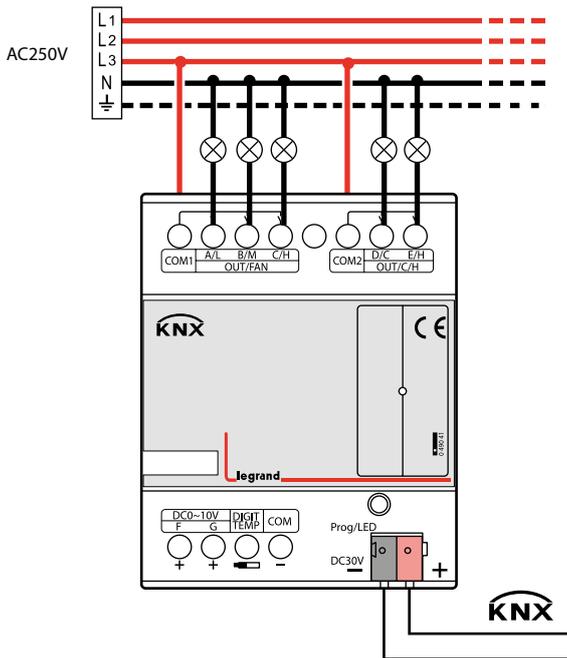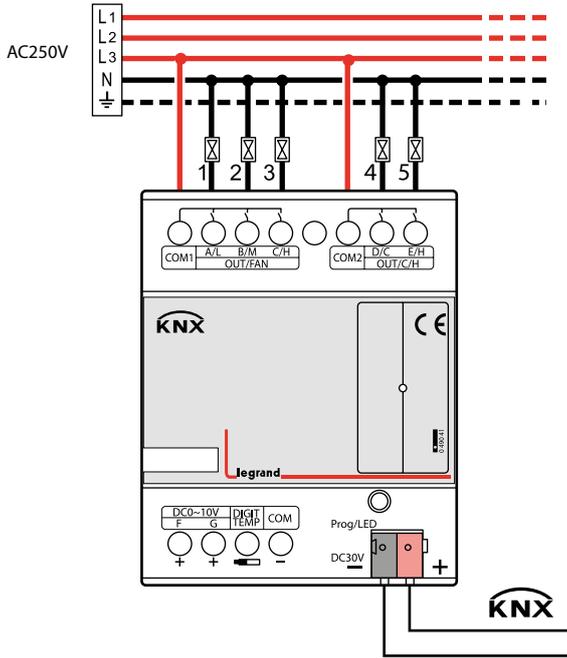d) Minimum dimensions of ventilating opening, if needed, and their correct arrangement.

2. HARDWARE (continued)

■ 2.4 Maintenance and Cautions

• Please read this user manual carefully before any operation.

• Don't close to the interfering devices.

• The site should be ventilated with good cooling environment.

• Pay attention to damp proof, quakeproof and dustproof.

• Avoid rain, other liquids or caustic gas.

• Please contact professional maintenance staff or HDL service center for repair or fix.

• Remove the dust regularly and do not wipe the unit with the volatile liquids like alcohol, gasoline, etc.

• If damaged by damp or liquid, turn off it immediately.

• Regularly check the circuitry and other related circuit or cables and replace the disqualified circuitry on time.

• For security, each circuit to connect an MCB or fuse

• Installation location should be well-ventilated, pay attention to moisture, shock, dust proof.

3. SOFTWARE

Fan Coil Unit Controller database use ETS3.0 to do the design.
The device types is 0 490 41. All Interface and the functions apply parameters please overview the following description of the paragraph.

Some function of the Fan Coil Unit Controller is the same. So, following paragraph will description of the function in detail.

■ 3.1 Database functions Overview
The following table provide an overview of the functions and some parameters with the Fan Coil Unit Controller:

Function	Descritpion
General	Supported functions, operation, channel select
Fan/Fan coil controller	Fan, Heating, Cooling, Heating and Cooling
System type	2-pipe system: There is one single water circuit that is filled with cooling or heating medium according to the season. 4-pipe system: The system consists of two separate water circuits for heating and cooling.
Actual temperature	Read actual temperature via the KNX or local sensor, response and monitoring the temperature
Setpoint	Base setpoint temperature, different operation mode (Comfort mode, Standby mode, Night mode, Frost/heat Protection mode) corresponding to different setpoint temperature.
Fan (Relay or 0-10v)	3-speed fan, Automatic or manual fan control
Heating valve (Relay or 0-10v)	Base settings for heating valve (Electrothermal valve or Proportional valve)
Cooling valve (Relay or 0-10v)	Base settings for cooling valve (Electrothermal valve or Proportional valve) Base valve settings for 2-pipe systems (Electrothermal valve or Proportional valve)
Heating/Cooling valve (Relay or 0-10v)	Response fan status and valve position status
Function status	
Floor heating	---
Slave clock	Used for floor heating time synchronized.
Actual temperature	Read actual temperature via the KNX or local sensor, response and monitoring the temperature
Operation mode	Base setting for the operation mode setpoint temperature. (Normal mode, Day mode, Night mode, Timer mode)
Valve	Base settings for floor heating valve
Switch controller	**Use of auxiliary relay**
Time function	Staircase lighting and ON/OFF delay
	Statistics total ON time
	Voltage recovery state and Voltage fail state

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3. SOFTWARE (continued)
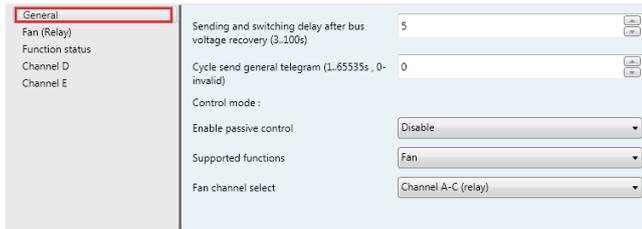
■ 3.2 Function parameter "General"

Fig. 1: "General" parameter window

In the parameter of the general windows can set the control mode and other parameters.

• Sending and switching delay after bus voltage recovery [3..100s]

Options: **3..100s**

Telegrams are only received during the send and switching delay. The telegrams are not processed, however, and the outputs remain unchanged, no telegrams are sent on the bus. After the sending and switching delay, telegrams are sent and the state of the outputs are set to correspond to the parameterisation or the communication object values.

• Cycle send general telegram (1..65535s _ 0-invalid)

The range of the parameter is 0 to 65535s. Zero of parameter disable the function, other of parameter enable this function

Options: **0..65535s**

The parameter set to nonzero, Device will send a telegram data cyclically when time out. Send the value alternately between 0 and 1.

• Control mode

-- Enable passive control

When this option is activated, the control mode is no longer active, the product acts as an actuator interface controlled by an external control signal

-- Supported functions

In the General parameter window, the basic settings for the Fan Coil Unit Controller which affect the device and all its outputs can be defined. The Fan Coil Unit Controller has five control modes. You can select the one of them. Through functional selection and download the database to the device, and device will work in accordance with the selected function.

Options: **Fan**
Heating
Cooling
Heating and cooling
Floor heating

Fan: The Fan Coil Unit Controller has fan function only. The free channels are available as independent switch outputs.

Heating: The Fan Coil Unit Controller has fan and heating functions. The free channels are available as independent switch outputs.

Cooling: The Fan Coil Unit Controller has fan and cooling functions. The free channels are available as independent switch outputs.

Heating and cooling: The Fan Coil Unit Controller has fan, heating and cooling functions. The free channels are available as independent switch outputs.

Floor heating: The Fan Coil Unit Controller has maximum seven channel floor heating. The free channels are available as independent switch outputs.

Fan, Heating or **Cooling** functions are the same with **Heating and Cooling** functions. So, the following paragraph will description of the **Heating and Cooling** and **Floor heating** functions in detail.

3. SOFTWARE (continued)

■ 3.3 Function parameter "Heating and Cooling"
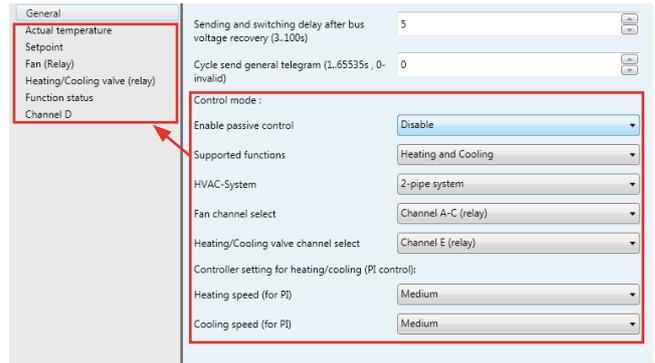
Fig. 2: "Heating and Cooling" 2-pipe system parameter window
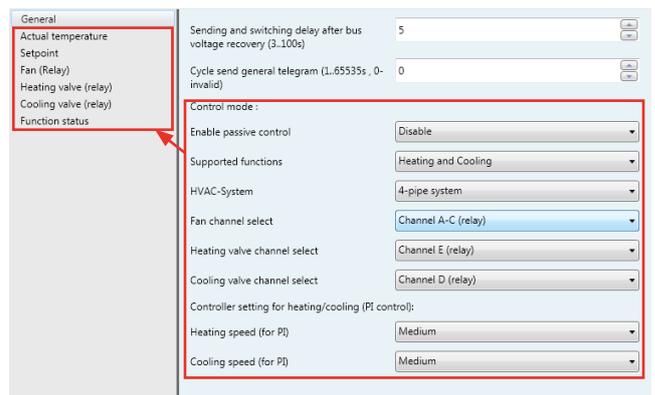
Fig. 3: "Heating and Cooling" 4-pipe system parameter window

• HVAC-System

Options: **2-pipe system**
4-pipe system

-- 2-pipe system

There is one single water circuit that is filled with cooling or heating medium according to the season.

The following points must be observed for use in a 2 pipe heating/cooling system:

• In the 2-wire system heating and cooling mediums (depending on the season) are fed through the same channels and controlled by the same valve.

• The switchover between heating and cooling mediums is performed by the system and must therefore be passed on to the controller.

Fig. 4: 2-pipe system

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3. SOFTWARE (continued)
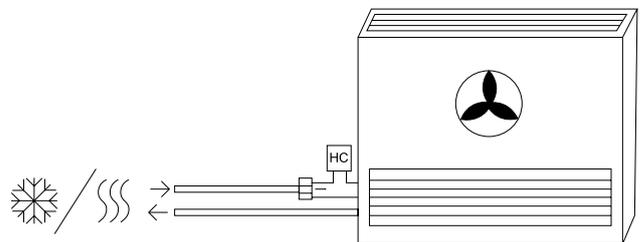
■ **3.3 Function parameter "Heating and Cooling" (continued)**

• **HVAC-System (continued)**

-- 4-pipe system

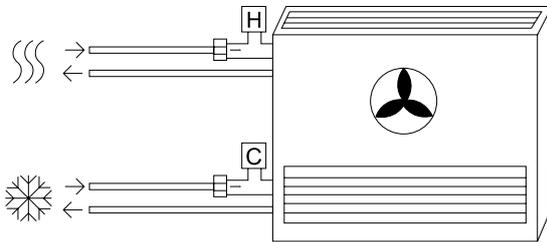The system consists of two separate water circuits for heating and cooling

Fig. 5: 4-pipe system

• **Fan channel select**

The Fan Coil Unit Controller has two ways of the fan channel output. According to the fan characteristic choose corresponding channel.

Options: **Channel A-C (relay)**
Channel F (0-10V)

Channel A-C (relay): Channels A, B and C with 3-Speed fan relay output. The free channels are available as independent switch outputs.

Channel F (0-10V): This channel is an analogue signal (0-10 V) used to controls fan speed.

• **Heating/Cooling valve channel select**

Only warm or only cold water is supplied centrally to the pipe system (**2-pipe system**). Depending on this setting one control value acts on one valve. According to the valve characteristic choose corresponding channel.

Options: **Channel E (relay)**
Channel G (0-10V)

Channel E (relay): This channel is relay output, suitable for electrothermal valve drives.

Channel G (0-10V): This channel is an analogue signal (0-10 V) output, suitable for proportional valve drives.

• **Heating valve channel select**

Only warm water is supplied centrally to the pipe system (4-pipe system or heating only system). According to the valve characteristic choose corresponding channel.

Options: **Channel E (relay)**
Channel G (0-10V)

Channel E (relay): This channel is relay output, suitable for electrothermal valve drives.

Channel G (0-10V): This channel is an analogue signal (0-10 V) output, suitable for proportional valve drives.

• **Cooling valve channel select**

Only cold water is supplied centrally to the pipe system (4-pipe system or cooling only system). According to the valve characteristic choose corresponding channel.

Options: **Channel D (relay)**
Channel F (0-10V)

Channel D (relay): This channel is relay output, suitable for electrothermal valve drives.

Channel F (0-10V): This channel is an analogue signal (0-10 V) output, suitable for proportional valve drives.

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

• **Controller setting for heating/cooling (PI control)**

-- Heating speed (for PI)

If you have sufficient knowledge in heating technology so that the appropriate settings are carried out correctly. The options are suitable for standard applications. It is only effective in valve types of control is "PWM control" or "Continuous-acton control"

Options: **Lower**
Low
Medium
Fast
Faster

Lower: Setting the PI controller response to lower for heating.
Low: Setting the PI controller response to low for heating.
Medium: Setting the PI controller response to medium for heating.
Fast: Setting the PI controller response to fast for heating.
Faster: Setting the PI controller response to faster for heating.

-- Cooling speed (for PI)

If you have sufficient knowledge in cooling technology so that the appropriate settings are carried out correctly. The options are suitable for standard applications. It is only effective in valve types of control is "PWM control" or "Continuous-acton control"

Options: **Lower**
Low
Medium
Fast
Faster

Lower: Setting the PI controller response to lower for cooling.
Low: Setting the PI controller response to low for cooling.
Medium: Setting the PI controller response to medium for cooling.
Fast: Setting the PI controller response to fast for cooling.
Faster: Setting the PI controller response to faster for cooling.

3.3.1 Actual temperature
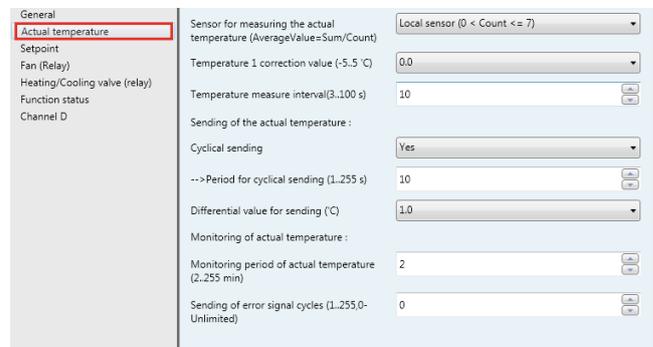
Fig. 6: "Actual temperature" parameter window

• **Sensor for measuring the actual temperature (AverageValue = Sum / Count)**

Setting the temperature sensor.

Options: **Local sensor (0 < Count < = 7)**
One sensor via KNX (Count = 1)
Two sensor via KNX (Count = 2)

Local sensor (0 < Count <= 7): the temperature sensor is must connected to the Fan Coil Unit Controller. Maximum can connect seven temperature sensor, the results take the average (AverageValue = Sum / Count). In this case, the three parameters for Sending of the actual temperature become visible.

Technical data sheet: S000093715EN-2

Updated: 23/04/2018

Created: 15/09/2016

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3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.1 Actual temperature (continued)

• **Sensor for measuring the actual temperature (AverageValue = Sum / Count) (continued)**
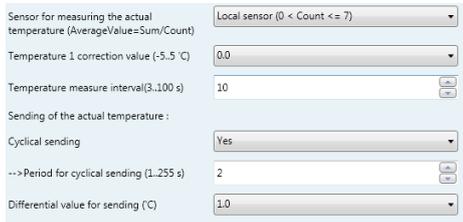
Fig. 7: "Local sensor (0 < Count <= 7)"

One sensor via KNX (Count = 1): The temperature is received via the KNX. Object 10 is the information input for KNX sensors.
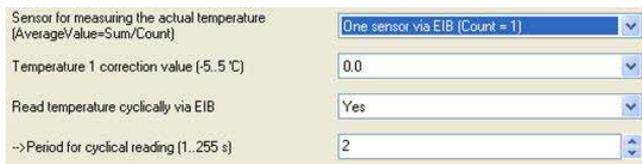
Fig. 8: "One sensor via KNX (Count = 1)"

Two sensor via KNX (Count = 2): The temperature is received via the KNX. Object 10 and 11 are the information input for KNX sensors. The results take the average (AverageValue = Sum / Count).

Fig. 9: "Two sensor via K NX (Count = 2)"

• **Temperature 1 correction value (-5..5 'C)**

Options [°C]: - **5.0..5.0 (0.0)**

Correction of the value measured by the temperature sensor or the actual value received via the KNX.

• **Temperature 2 correction value (-5..5 'C)**

Options [°C]: **-5.0..5.0 (0.0)**

Correction of the value measured by the actual value received via the KNX. This parameter is only visible if the option "**Two sensor via KNX (Count = 2)**" has been selected for the parameter **Sensor for measuring the actual temperature (AverageValue = Sum / Count)**.

• **Sending of the actual temperature**

-- **Cyclical sending**

Options: **NO**
                YES

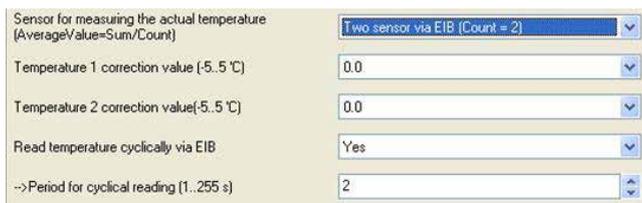Activation of the cyclical transmission function for the actual temperature. This parameter is only visible if the option "**Local sensor (0 < Count <= 7)**" has been selected for the parameter Sensor for measuring the actual temperature (AverageValue = Sum / Count).

-- **Period for cyclical sending (1..255 s)**

Options: **1..255s (2)**

Setting the cyclical transmission period for the actual temperature. This parameter is only visible if the option "**YES**" is selected for the parameter **Cyclical sending**.

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.1 Actual temperature (continued)

• **Sending of the actual temperature (continued)**

-- **Differential value for sending ('C)**

Options: **0.5..3 (1)**

Setting the temperature change at which the actual temperature is sent in addition to being sent after a change in value. This parameter is only visible if the option "**Local sensor (0 < Count <= 7)**" has been set for the parameter **Sensor for measuring the actual temperature (AverageValue =Sum / Count)**.

• **Read temperature cyclically via KNX**

Options: **NO**
                YES

Activation of the cyclical reading function for the actual temperature via KNX. This parameter is only visible if the option "**One sensor via KNX (Count = 1)**" or "**Two sensor via KNX (Count = 2)**" is set for the parameter Sensor for measuring the actual temperature (AverageValue =Sum / Count).

-- **Period for cyclical reading (1..255 s)**

Options: **1..255s (2)**

Setting the cyclical reading period for the actual temperature via KNX. This parameter is only visible if the option "**YES**" is selected for the parameter **Read temperature cyclically via KNX**.

• **Monitoring of actual temperature**

-- **Monitoring period of actual temperature (2..255 min)**

Options: **2..255 min (2)**

Setting the monitoring period for the actual temperature (local temperature sensor or via the KNX).

-- **Sending of error signal cycles (1..255,0-Unlimited)**

Options: **0..255 (0)**

For setting the send repetition in the event of an error message. If the option "1..255" is selected, the error signal is only sent 1..255 counts if there is a change in the object value. If the option "0-Unlimited" is set, the object value is sent according to the parameterised **Monitoring period of actual temperature (2..255 min)**.
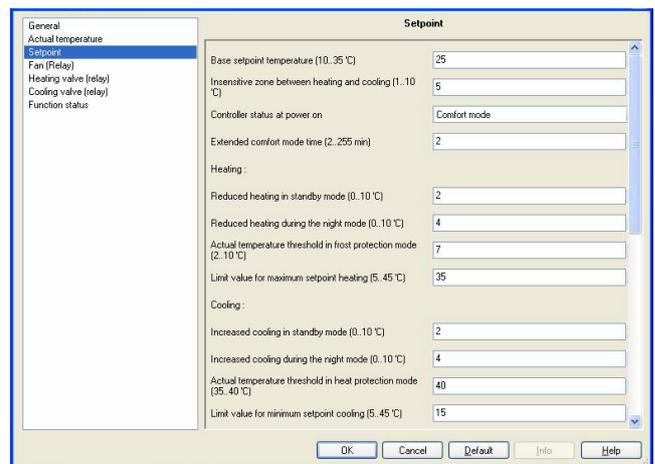
3.3.2 Setpoint

Fig. 10: "Setpoint" parameter window

• **Base setpoint temperature (10..35 'C)**

Options: **10..35 'C (25)**

Setting the base setpoint temperature. This is stored in non-volatile memory. Can be modified with a telegram to the communication object "**Setpoint – Base setpoint temperature**".

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.2 Setpoint (continued)

• **Insensitive zone between heating and cooling (1..10 'C)**

Options: **1..10 'C (5)**

Setting the insensitive zone in degrees centigrade. The insensitive zone is a buffer area between heating and cooling operation. Neither heating nor cooling takes place within this insensitive zone. Without this buffer zone, the system would switch continuously between heating and cooling. As soon as the set point value has been under-run, the heating is activated and the set point value would not be achieved. If cooling were then to be started immediately, the temperature would fall below the set point value and switch on the heating again. This parameter is only visible if the option "4-pipe system" is selected for the parameter **HVAC-System**.

• **Controller status at power on**

Options: **Unchanged**
Comfort mode
Standby mode
Night mode
Frost/heat protection

When the installation is switched on, the device is set to the required HVAC mode. During operation, a selection can be made via the KNX. The ON commands are entered via the following objects:

Comfort mode: 31
Standby mode: 32
Night mode: 33
Frost protection: 34

• **Extended comfort mode time (2..255 min)**

Options: **2..255 min (2)**

Setting the duration of the comfort extension mode. If the device has been switched from comfort mode to night mode, the comfort extension is activated for the parameterised time by a telegram to the communication object "**HVAC mode– ON command for comfort mode**"and then switched back automatically to night mode.

• **Heating**

-- **Reduced heating in standby mode (0..10 'C)**

Options: **0..10 'C (2)**

For setting the temperature reduction when heating in standby mode The reduction in temperature is calculated starting with the base setpoint temperature.

-- **Reduced heating during the night mode (0..10 'C)**

Options: **0..10 'C (4)**

For setting the temperature reduction when heating during night mode.The reduction in the temperature is calculated starting with the base setpoint temperature.

-- **Actual temperature threshold in frost protection mode (2..10 'C)**

Options: **2..10 'C (7)**

Setting the minimum frost protection temperature. When this temperature is reached, the heating is automatically turned up to prevent the temperature falling below the threshold value.

-- **Limit value for maximum setpoint heating (5..45 'C)**

Options: **5..45 'C (35)**

Setting the maximum setpoint temperature for heating. The room is not heated above this temperature.

• **Cooling**

-- **Increased cooling in standby mode (0..10 'C)**

Options: **0..10 'C (2)**

For setting the temperature increase when cooling in standby mode. The increase in temperature is calculated starting with the base setpoint temperature.

-- **Increased cooling during the night mode (0..10 'C)**

Options: **0..10 'C (4)**

For setting the temperature increase when cooling during night mode. The increase in the temperature is calculated starting with the base setpoint temperature.

-- **Actual temperature threshold in heat protection mode (35..40 'C)**

Options: **35..40 'C (40)**

Setting the maximum heat protection temperature. When this temperature is reached, the cooling is automatically switched on to prevent the threshold value from being exceeded.

-- **Limit value for minimum setpoint cooling (5..45 'C)**

Options: **5..45 'C (15)**

Setting the minimum setpoint temperature for cooling. The room is not cooled below this temperature. The toggling between the HVAC modes is carried out via communication objects:
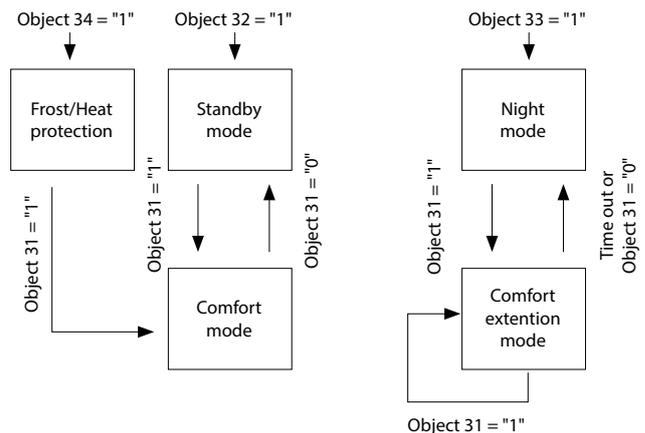
Fig. 11: HVAC mode selection via communication objects

Object 31: HVAC mode – ON CMD for comfort mode

Object 32: HVAC mode – ON CMD for standby mode

Object 33: HVAC mode – ON CMD for night mode

Object 34: HVAC mode – ON CMD for building protection (Frost/Heat protection) mode

Time out: Parameterised **Extended comfort mode time** has elapsed

The difference between comfort mode and comfort extension is that the toggling from comfort mode to another mode is triggered via a communication object while switching from comfort extension mode to another mode also takes place automatically once the parameterized **Extended comfort mode time** has elapsed.

Calculation of the setpoints for the various HVAC modes:

• **Comfort mode:**

• Heating setpoint temperature = Base setpoint temperature
• Cooling setpoint temperature = Base setpoint temperature
                    In the 4-pipe system automatic heating/cooling mode:
• Cooling setpoint temperature = Base setpoint temperature + Insensitive zone

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.2 Setpoint (continued)

• Standby mode:

• Heating setpoint temperature = Base setpoint temperature - Reduced heating in standby mode

• Cooling setpoint temperature = Base setpoint temperature + Increased cooling in standby mode.

In the 4-pipe system automatic heating/cooling mode:

• Cooling setpoint temperature = Base setpoint temperature + Insensitive zone + Increased cooling in standby mode

• Night mode:

• Heating setpoint temperature = Base setpoint temperature - Reduced heating during night mode

• Cooling setpoint temperature = Base setpoint temperature + Increased cooling during night mode

In the 4-pipe system automatic heating/cooling mode:

• Cooling setpoint temperature = Base setpoint temperature + Insensitive zone + Increased cooling during night mode

• Frost/Heat protection:

• Heating setpoint temperature = Threshold value for frost protection

• Cooling setpoint temperature = Threshold value for heat protection

The setpoint temperature is restricted by the setpoint limit value. The setpoint limit for heating defines the maximum temperature for heating the room. The setpoint limit for cooling defines the minimum temperature for cooling the room.

3.3.3 Fan

The fan coil actuator can be adapted very flexibly to the specific fan coil application required by means of parameter configurations. Thus initially the number of fan level required for the connected devices can be defined. Fan coil actuator has two channel can choose, one of channel is a relay output, the other is an analogue signal (0-10 V) output. According to the fan characteristic choose corresponding channel.
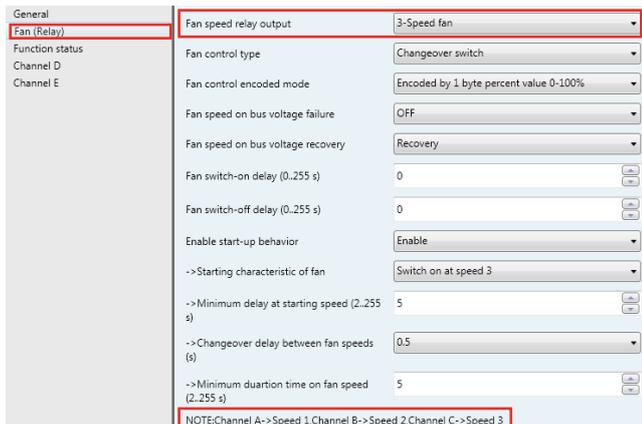
Fig. 12: "Fan (relay)" parameter window

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.3 Fan (continued)

• Fan speed relay output

Setting the number of fan speeds. This parameter is only visible if the option "Channel A-C (relay)" has been selected for the parameter Fan channel select. The maximum number of usable fan levels depends on this parameter. In the configuration with Channel A-C (relay) a maximum of 3 fan levels can be used. Fan level outputs of a fan coil channel which are not used can optionally be used as switching outputs with a simple switching function.

　　Options: **1-Speed fan**
　　　　　　2-Speed fan
　　　　　　3-Speed fan

1-Speed fan: The fan has only 1-speed connect to the channel A (Channel A - > Speed 1).

2-Speed fan: The fan has 2-speed connect to the channel A and channel B (Channel A - > Speed 1, Channel B - > Speed 2).

3-Speed fan: The fan has 3-speed connect to the channel A, channel B and channel C (Channel A - > Speed 1, Channel B - > Speed 2, Channel C - > Speed 3).
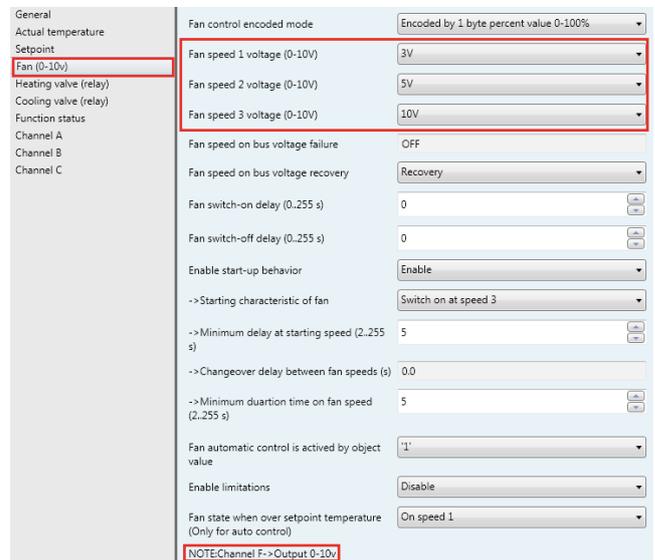
Fig. 13: "Fan (0-10v)" parameter window

　　-- Fan speed 1 voltage (0-10V)

　　-- Fan speed 2 voltage (0-10V)

　　-- Fan speed 3 voltage (0-10V)

　　Options: **0v...10v**

Setting the voltage of fan speeds. This parameter is only visible if the option "**Channel F (0-10v)**" has been selected for the parameter **Fan channel select**. The fan has connect to the channel F.

　　-- Fan speed on bus voltage failure

　　Options: **Unchanged**
　　　　　　OFF

The behavior of the fan with a bus voltage failure is defined here.

unchanged: The fan speeds of the fan remain unchanged.

OFF: The fan is switched off.

　　-- Fan speed on bus voltage recovery

　　Options: **Recovery**
　　　　　　OFF
　　　　　　1
　　　　　　2
　　　　　　3

Set the speed of the fan when voltage recovery.

Recovery: After bus voltage recovery, the fan speed will be back to the speed of the power-down previous.

Off: The fan will switch OFF after bus voltage recovery.

1, 2 or 3: The fan switches to fan speed 1, 2 or 3.

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.3 Fan (continued)

• **Fan switch-on delay (0..255 s)**

Options: **0..255**

Set the delay of switch-on. The range is 0..255.

• **Fan switch-off delay (0..255 s)**

Options: **0..255**

Set the delay of switch-off. The range is 0..255.

• **Starting characteristic of fan**

Options: **Switch on at speed 1**
Switch on at speed 2
Switch on at speed 3

Setting the speed at which the fan switches on. To ensure that the fan motor starts reliably, it is advisable to start at a higher speed initially, depending on the type, in order to maintain a higher torque at start-up. Once the **Minimum delay at starting speed** has elapsed, the fan is switched to the speed that corresponds to the control value. Fig. 7 shows an example of the response for the option "switch on at speed 3".
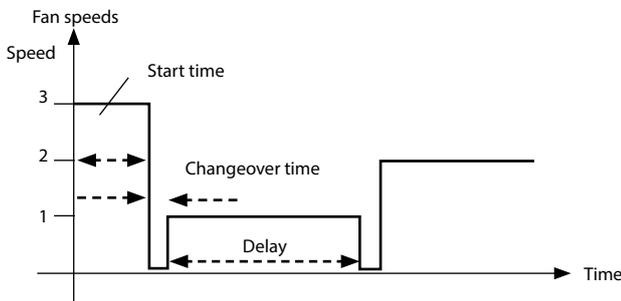
Fig. 14: Switch fan on at speed 3

• **Minimum delay at starting speed (2..255s)**

Options: **2..255s**

The starting time of the fan is entered here which can vary from fan to fan depending on the inertia of the rotating components.

• **Changeover delay between fan speeds(s)**

Options: **0.5..10s**

Setting the changeover delay between the fan speeds. This parameter is only effective if the option "Channel A-C (relay)" has been set for the parameter **Fan channel select**.

• **Minimum duration time on fan speed (2..255 s)**

Options: **2..255s**

Used to prevent frequent toggling between fan speeds which can be detrimental to comfort levels.

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.3 Fan (continued)

• **Enable limitations (Automatic fan control)**

Options: **Disable**
Enable

Disable: Disable the fan limitations function.

Enable: Further parameters become visible, set as follows
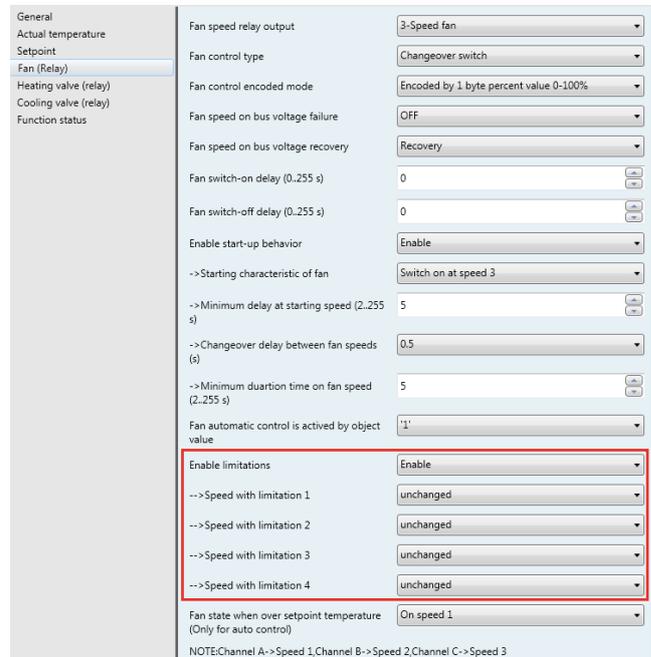
Fig. 15: Enable limitations (Automatic fan control)

At the same time, four communication objects for limitation of the fan speed are enabled:

Limitation 1, e.g. for frost/heat protection
Limitation 2, e.g. for comfort operation
Limitation 3, e.g. for night shutdown
Limitation 4, e.g. for standby operation

Speed ranges (limitations) are defined for the fan with the speed limitation function that may not be exceeded or undershot. Four limitations are available. This can be used for example for the control of various operating modes, e.g. frost/heat protection, comfort, night shut down and standby. In normal cases the thermostat takes these operating modes into account in its control variable for the actuator.

> **Important:**
>
> The parameterised starting behaviour which is a technical characteristic of the fan has a higher priority than a limitation operation, i.e. if a limitation is activated in fan speed 2 and a start-up behaviour is parameterised via fan speed 3, the following behaviour will result: The fan is in the OFF state and receives a control signal for fan speed 1. Initially the fan operates at fan speed 3 (start-up speed) and then proceeds to fan speed 2 which is defined by the limitation. The actual required fan speed 1 will not be achieved due to the limitation.

When automatic mode is exited, e.g. by a manual action, the limitations become inactive. The set limitations are reactivated after automatic operation is reactivated.

The following points apply for limitations:
• The fan speed and valve position can be parameterised independently.
• The limitation need not necessarily apply to one fan speed only. It can also encompass another range of the fan speeds, i.e. only certain fan speeds can be set if the limitation is active. In this way a limited control is also possible.

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3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.3 Fan (continued)

- The limitation is activated if a telegram with the value 1 is received on the limitation object. The limitation is deactivated if a telegram with the value 0 is received on the limitation object. A manual action ends automatic mode.
- If a limitation is activated, the Fan Coil Controller switches to the parameterised fan speed regardless of the control value. If during the activation of the limitation another fan speed or a fan speed outside the range of the "limitation range" is set, the required fan speed or the limit fan speed of the range is set.
- After switch off of the limitations, the fan speed and the communication objects for valve control are recalculated and executed, This means that during limitation the actuator operates normally in the background, the outputs are not changed and implementation only occurs after the end of limitation.

There are the same parameters and priority for each of the individual four limitations used to limit the fan speeds. If several ON commands 1 are received by the various fan speed limitation objects, the value that was last received for the fan limitation control is decisive. This also applies for the OFF command 0.

-- Speed with limitation 1

-- Speed with limitation 2

-- Speed with limitation 3

-- Speed with limitation 4

Options: **3, 2, 1, OFF**
unchanged
OFF
1
1, OFF
2
2, 1
2, 1, OFF
3
3, 2
3, 2, 1

With this parameter you set the fan speed that is set with active limitation, and the fan speed is set with automatic control.

3, 2, 1, OFF: Everything is possible.

Unchanged: The state is retained.

OFF: Off.

1: limited to speed 1.*

1, OFF: limited to speed 1 and off.

2: limited to speed 2.*

2, 1: limited to speed 2 and 1.

2, 1, OFF: limited to speed 2, 1 and off.

3: limited to speed 3.*

3, 2: limited to speed 3 and 2.

3, 2, 1: limited to speed 3, 2 and 1.

> **Note:**
> * The control value is ignored.

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.4 Valve

The Fan Coil Unit Controller can control the following valve drives:

- Electromotive valve drives: Electromotive valve drives close and open valves via a small electric motor. It is available as proportional valve drives. Proportional valve drives are controlled via an analogue signal (0..10 V).
- Electrothermal valve drives: Electrothermal valve drives are adjusted via the heat expansion of a material as a result of a flow of electrical current. Electrothermal valve drives are regulated via two-step control or pulsewidth modulation.

3.3.4.1 Heating/Cooling valve (relay)
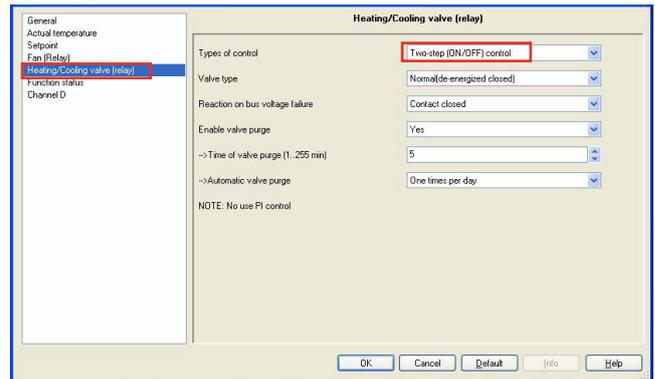
Fig. 16: "Heating/Cooling valve (relay)" Two-step (ON/OFF) control parameter window This parameter window is only visible if the option "Channel E (relay)" has been selected for the parameter Heating/Cooling valve channel select in the 2-pipe system.

Fig. 17: "Heating valve (relay)" Two-step (ON/OFF) control parameter window The parameter windows "Heating/Cooling valve (relay)", "Heating valve (relay)" and "Cooling valve (relay)" are largely similar. Only the default values for the cycle time differ from each other.

• **Types of control**

Options: **Two-step (ON/OFF) control**
PWM control

Two-step (ON/OFF) control: the valve is fully opened if the room temperature falls below a lower limit value while the valve is fully closed if the room temperature exceeds an upper limit value. This types of control is not used PI control.

Upper limit value = Setpoint temp. + 1°C
Lower limit value = Setpoint temp. – 1°C

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.4 Valve (continued)

3.3.4.1 Heating/Cooling valve (relay) (continued)
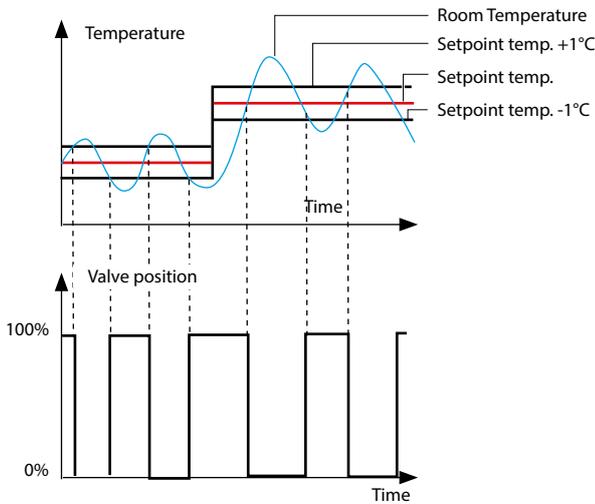
Fig. 18: Diagram for 2-step control

PWM control: The control value is fixed for a cyclic period and converted into the valve opening duration. For example, the control value 20 % is converted at a cyclic period of 15 minutes into a valve opening time of 3 minutes. The control value 50 % produces a valve opening time of 7.5 minutes. This types of control is used PI control. In the following fig19. is the PWM control diagram:

Fig. 19: PWM control diagram

• **Valve type**

Options: **Inverted (de-energized opened)**
Normal (de-energized closed)

Setting the control direction of the valve.

• **Reaction on bus voltage failure**

Options: **Contact unchanged**
Contact open
Contact closed

Contact unchanged: No change of the contact position.

Contact opened: The contact is opened with bus voltage failure.

Contact closed: The contact is closed with bus voltage failure.

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.4 Valve (continued)

3.3.4.1 Heating/Cooling valve (relay) (continued)

• **Enable valve purge**

Options: **NO**
Yes

NO: Disable valve purge.

YES: The 1 bit Trigger valve purge communication object is enabled.

With this parameter, the function of a valve purge of the output can be enabled. Regular purging of a heating valve can prevent deposits from forming in the valve area and restricting the valve function. At the same time it is assured that the heating element is purged which simplifies the bleeding of trapped air. This is particularly important at times when the valve position does not change very much. The valve is opened to the maximum during a valve purge. It can be triggered via the object **Trigger valve purge** and/or automatically at adjustable intervals. With the option yes, the objects **Trigger valve purge** and **Status valve purge** are enabled. Also the parameter **Time of valve purge in minutes (1..255)** and **Automatic valve purge** are enabled.

Fig. 20: Enable valve purge

-- Time of valve purge (1..255min)

Options: **1..255min**

Set the time for the valve purge. In this time the valve is fully opened. When the time has elapsed, the state before the purge is re-established.

-- Automatic valve purge

Set the automatic valve purge frequency.

Options: **NO**
One times per day
One times per week
One times per month

One times per day: Automatic valve purge every day.

One times per week: Automatic valve purge every week.

One times per month: Automatic valve purge every month.

A purge can be initiated by the object **Trigger valve purge**. The counter for automatic purging starts to run when the parameter is loaded in the actuator. The time is reset each time it is downloaded. The time is reset as soon as purging is completed. This can occur either through automatic purging or via the object **Trigger valve purge**.

The following paragraph will description of the PWM control of the valve type in detail.
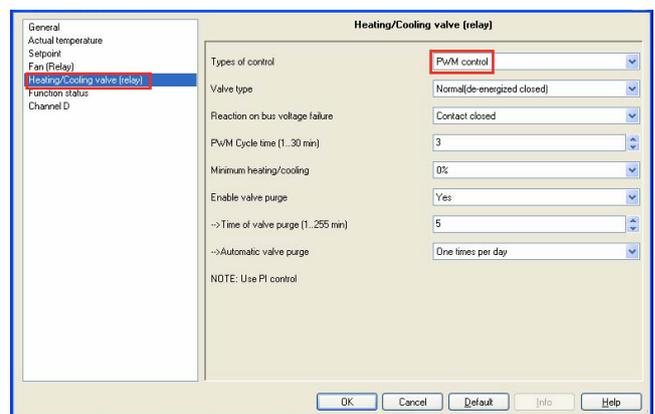
Fig. 21: "Heating/Cooling valve (relay)" PWM control parameter window

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.4 Valve (continued)
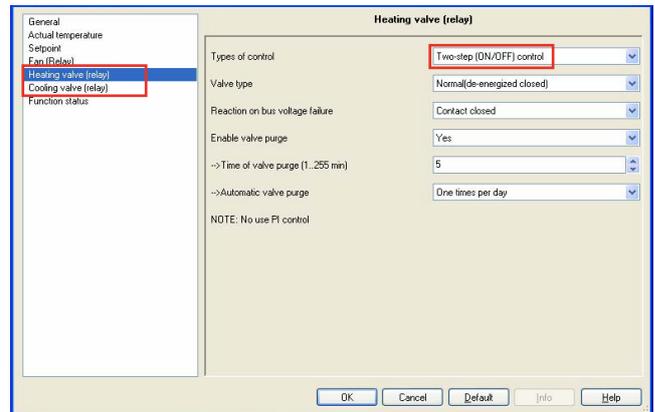
3.3.4.1 Heating/Cooling valve (relay) (continued)
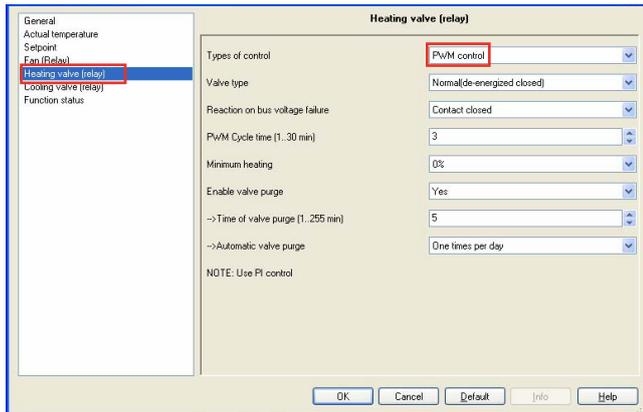
Fig. 22: "Heating valve (relay)" PWM control parameter window

The parameter windows "Heating/Cooling valve (relay)", "Heating valve (relay)" and "Cooling valve (relay)" with the both of control type functions are largely similar. Only the following functions differ from each other.
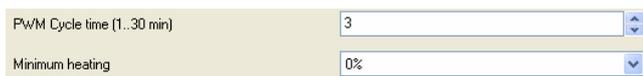
Fig. 23: PWM control parameter

• **PWM Cycle time (1..30min)**

This is used to set the cycle time of the PWM control.

Options: **1..30min**

An actuation cycle consists of one on and one off process and forms a PWM period. Example: Actuating value= 20%, PWM time = 10 min: In an actuating cycle of 10 min, 2 min switched on and 8 min switched off (i.e. 20% on/80% off). To fully open an electrothermal control valve takes approximately 2-3 minutes. That is why a cycle time of less than 15 minutes is not practical.

If a PWM cycle time of 15 minutes has been selected, this means that 4 switching operations (switching on/of) occur each hour. 96 in a day; 3000 in a month. About 36,000 switching operations are achieved annually. With a relay life of 105 switching operations, this means a switch actuator life of less than 3 years.

If however, the cycle time is set to just 3 minutes, this means about 150,000 switching operations annually, which normally means the life of the switch actuator would be less than a year.
This observation assumes an AC1 (practically ohmic load) switch loading at rated current. If the maximum number of switching operations for a purely mechanical relay loading is assumed, the life of the switch actuator is extended. This has an inherent risk, as the contact materials will wear prematurely and cannot safely guarantee conduction of current.

In the following table, conventional cycle times for control of various heating and air-conditioning systems are listed:

Heating system	Control type	Cycle time
Hot water Supply temperature 45°C - 70°C	PWM	15 minutes
Hot water Supply temperature < 45 °C	2-step PWM	- 15 minutes
Underfloor/wall heating	PWM	30-20 minutes
Electric underfloor heating	PWM	30-20 minutes
Electric fan heating	2-step	-
Electric convection heating	PWM 2-step	10-15 minutes -

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.4 Valve (continued)

3.3.4.1 Heating/Cooling valve (relay) (continued)

• **Minimum heating**

Options: **0%,5%,10%,15%,20%,**

Minimum permissible valve setting with actuating value.

3.3.4.2 Heating/Cooling valve (0-10v)
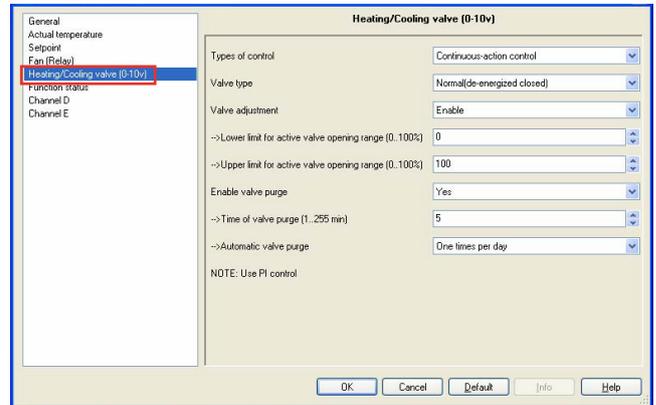
Fig. 24: "Heating/Cooling valve (0-10v)" parameter window This parameter window is only visible if the option "Channel G (0-10v)" has been selected for the parameter Heating/Cooling valve channel select in the 2-pipe system
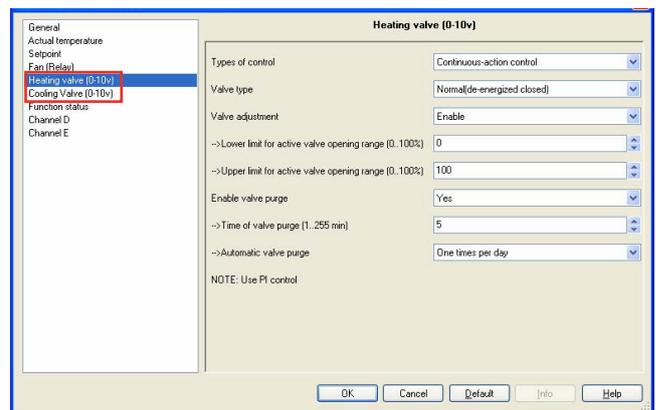
Fig. 25: "Heating valve (0-10v)" parameter window

The parameter windows "Heating/Cooling valve (0-10v)", "Heating valve (0-10v)" and "Cooling valve (0-10v)" are largely similar.

• **Types of control**

Options: **ON (10V)/OFF (0V) control**
Continuous-action control

ON (10V)/OFF (0V) control: the valve is fully opened (10v) if the room temperature falls below a lower limit value, while the valve is fully closed (0v) if the room temperature exceeds an upper limit value. This types of control is not used PI control. It used the same with T**wo-step (ON/OFF)control**.
Upper limit value=Setpoint temp. + 1°C
Lower limit value=Setpoint temp. – 1°C

Continuous-action control: A continuous controller has a continuously changing control value which can output voltage between 0v to 10v, it can be used to activate proportional valve drives. The valve can thereby be fully opened, fully closed and moved to any intermediate position. This types of control is used PI control.

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.4 Valve (continued)

3.3.4.2 Heating/Cooling valve (0-10v) (continued)
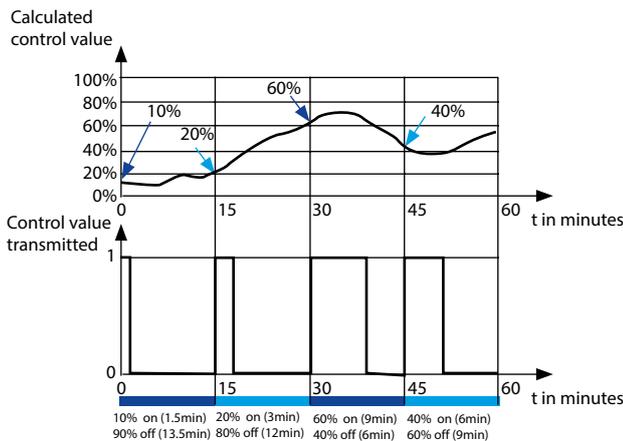
• **Valve type**

Options: **Inverted (de-energized opened)**
Normal (de-energized closed)

Setting the control direction of the valve.

• **Valve adjustment**

User-defined adjustment of the valve characteristics.

Options: **Disable**
Enable

Disable: Disable the valve adjustment.

Enable: Enable the valve adjustment.

Only select the option "Enable" if you have sufficient knowledge in heating and cooling technology so that the appropriate settings are carried out correctly. The option "Disable" is suitable for standard applications.

-- **Lower limit for active valve opening range (0..100%)**

-- **Upper limit for active valve opening range (0..100%)**

Options: **0..100%**

For setting the valve characteristic curve i.e. the valve position dependent on the control value.

• **Enable valve purge**

Options: **NO**
Yes

NO: Disable valve purge.

YES: The 1 bit Trigger valve purge communication object is enabled With this parameter, the function of a valve purge of the output can be enabled. Regular purging of a heating valve can prevent deposits from forming in the valve area and restricting the valve function. At the same time it is assured that the heating element is purged which simplifies the bleeding of trapped air. This is particularly important at times when the valve position does not change very much. The valve is opened to the maximum during a valve purge. It can be triggered via the object Trigger valve purge and/or automatically at adjustable intervals. With the option yes, the objects Trigger valve purge and Status valve purge are enabled. Also the parameter Time of valve purge in minutes (1..255) and Automatic valve purge are enabled.

Fig. 26: Enable valve purge

• **Time of valve purge (1..255min)**

Options: **1..255min**

Set the time for the valve purge. In this time the valve is fully opened. When the time has elapsed, the state before the purge is re-established.

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.4 Valve (continued)

3.3.4.2 Heating/Cooling valve (0-10v) (continued)

• **Automatic valve purge**

Set the automatic valve purge frequency.

Options: **NO**
One times per day
One times per week
One times per month

One times per day: Automatic valve purge every day.

One times per week: Automatic valve purge every week.

One times per month: Automatic valve purge every month.

A purge can be initiated by the object **Trigger valve purge**. The counter for automatic purging starts to run when the parameter is loaded in the actuator.
The time is reset each time it is downloaded. The time is reset as soon as purging is completed. This can occur either through automatic purging or via the object **Trigger valve purge**.

3.3.5 Function status
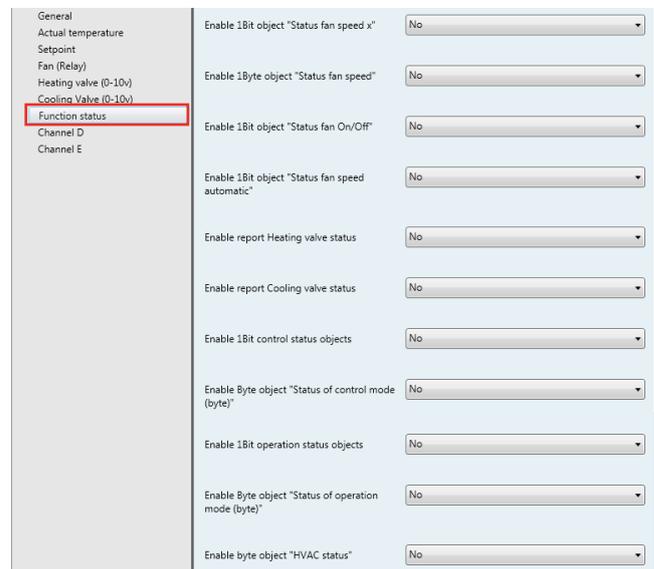
Fig. 27: "Function status" parameter window

• **Enable 1Bit object "Status fan speed x" (x: 1,2,3)**

Options: **NO**
Yes

Set the enable of the response about the fan speed's status.

NO: There is not response.

Yes: Three 1 bit communication objects, Status fan speed x, x = 1 to 3 are enabled.
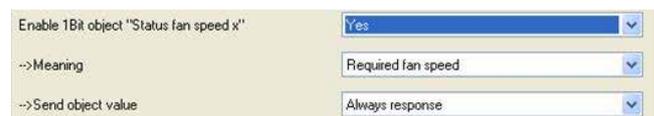
Fig. 28: 1Bit fan speed status

-- **Meaning**

This parameter defines whether the status of the current fan speed or the required fan speed is displayed.

Options: **Current fan speed**
Required fan speed

Current fan speed: it response the fan speed is actually operating.

Required fan speed: it response the fan speed has to be achieved.

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.5 Function status (continued)

-- Send object value

Options: **No, update only**
Always response
Only after change

No, update only: The status byte is always updated but never sent.

Always response: The status byte is always sent regardless whether the status changes.

Only after change: Status changes are sent to the status bit on the KNX.

-- **Object sending range**

Options: - All status object: Sending status of all objects
- Only activated status object: Sending the status of the activated object

-- **Valid object value (0/1): Set the object value**

• **Enable 1Byte object "Status fan speed "**

This status byte defines the figure value of the fan speed.

Options: **NO**
Yes

Yes: The object Status fan speed is enabled. This status byte defines the numerical value of the fan speed. This can be the actual or target speed depending on the parameterisation.

The following value assignment is applied:

-- **1Byte value encode mode**

Options: - Encoded by 1 byte constant value (0-3)

1-byte values	Hexadecimal	Binary value	Speed
0	00	00000000	0 (off)
1	01	00000001	Speed 1
2	02	00000010	Speed 2
3	03	00000011	Speed 3

- Encoded by 1 byte percent value 0-100%

With the enabling of the 1-byte status display **Status fan speed**, two further parameters appear:

Fig. 29: 1 byte fan speed status

-- **Meaning**

This parameter defines whether the status of the current fan speed or the required fan speed is displayed.

Options: **Current fan speed**
Required fan speed

Current fan speed: it response the fan speed is actually operating.

Required fan speed: it response the fan speed has to be achieved.

-- **Send object value**

Options: **No, update only**
Always response
Only after change

No, update only: The status byte is always updated but never sent.

Always response: The status byte is always sent regardless whether the status changes.

Only after change: Status changes are sent to the status bit on the KNX.

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.5 Function status (continued)

• **Enable 1Bit object "Status fan On/Off"**

Options: **NO**
Yes

NO: there is not response.

Yes: it response the fan speed status On or Off.

Some fans initially require an ON telegram before they are set to a fan speed from the OFF state. This ON telegram effects a main switch which has to be switched on.

This demand can be implemented with any switch output which is controlled via the Status fan communication object. The corresponding switch communication object of the switch actuator should be connected with the **Status fan** communication object.

Fig. 30: 1Bit fan speed ON/OFF status

-- **Send object value**

Options: **No, update only**
Always response
Only after change

No, update only: The status is always updated but not sent.

Always response: The status is always sent regardless whether the status changes.

Only after change: Status changes are sent to the status bit on the KNX.

• **Enable 1Bit object "Status fan speed automatic"**

Options: **NO**
Yes

NO: There is not response.

Yes: It response the fan speed automatic status.

Fig. 31: 1Bit fan speed automatic status

-- **Send object value**

Options: **No, update only**
Always response
Only after change

No, update only: The status is always updated but not sent.

Always response: The status is always sent regardless whether the status changes.

Only after change: Status changes are sent to the status bit on the KNX.

• **Enable report "heating or cooling " valve status**

Options: **NO**
Yes

NO: there is not response.

Yes: it response the valve position status.

3. SOFTWARE (continued)

■ **3.3 Function parameter "Heating and Cooling" (continued)**

3.3.5 Function status (continued)

• Enable report "heating or cooling " valve status (continued)

  -- Send object value

  Options: **No, update only:** status byte is always updated but never sent.
  Only after change: Status changes are sent to the status bit on the KNX

  -- Type of status report

  Options: **Report movement PWM>0/PWM=0; Status ON** as long as PWM control is active
  Report position ON/OFF: The status recopies the state of the valve

• Enable 1 bit control status objects:

  indication of mode: auto, heating, cooling, off, fan only

  -- Send object value

  Options: **No, update only:** status byte is always updated but never sent.
  Only after change: Status changes are sent to the status bit on the KNX.

  -- Object sending range

  Options: **All status object:** Sending status of all objects
  Only activated status object: Sending the status of the activated object

• Enable Byte objects "status of control mode":

  indication of mode: auto, heating, cooling, off, fan only

  -- Send object value

  Options: **No, update only:** status byte is always updated but never sent.
  Only after change: Status changes are sent to the status bit on the KNX.

• Enable 1 bit operation status objects":

  indication of mode: confort, standby, night, protection

  -- Send object value

  Options: **No, update only:** status byte is always updated but never sent.
  Only after change: Status changes are sent to the status bit on the KNX.

  -- Object sending range

  Options: **All status object:** Sending status of all objects.
  Only activated status object: Sending the status of the activated object.

• Enable Byte objects "status of operation mode":

  indication of mode: confort, standby, night, protection

  -- Send object value

  Options: **No, update only:** status byte is always updated but never sent.
  Only after change: Status changes are sent to the status bit on the KNX.

• Enable Byte objects "HVAC status": Control and operation mode

  -- Send object value

  Options: **No, update only:** status byte is always updated but never sent.
  Only after change: Status changes are sent to the status bit on the KNX.

3. SOFTWARE (continued)

■ **3.4 Function parameter "Floor Heating"**
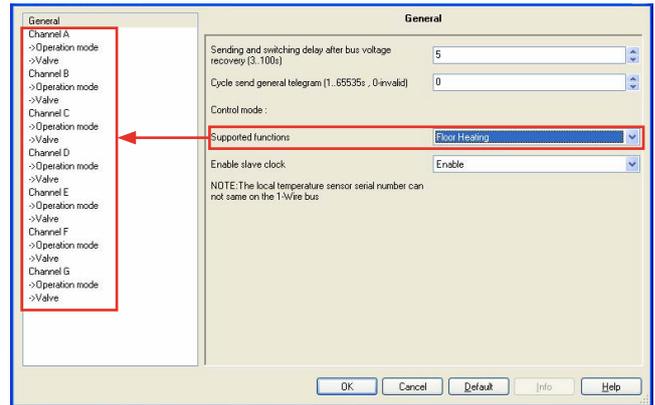
Fig. 33: "Floor Heating" parameter window

Setting the functions of the floor heating. This parameter is only visible if the option "Floor Heating" has been selected for the parameter **Supported functions**. It can be configured maximum seven channels and parameterised independently. Each channels can be read the temperature via the KNX or the local temperature sensors.

• Enable slave clock

  Options: **Disable**
  Enable

Disable: Disable the slave clock.

Enable: Enable the slave clock, only used for timer mode. At the same time, three communication objects for activation of the slave clock are enabled. The local clock of slave system clock shall be synchronised by reception of a 'System Clock' information from the master system clock.

3.4.1 Channel A (Floor heating)
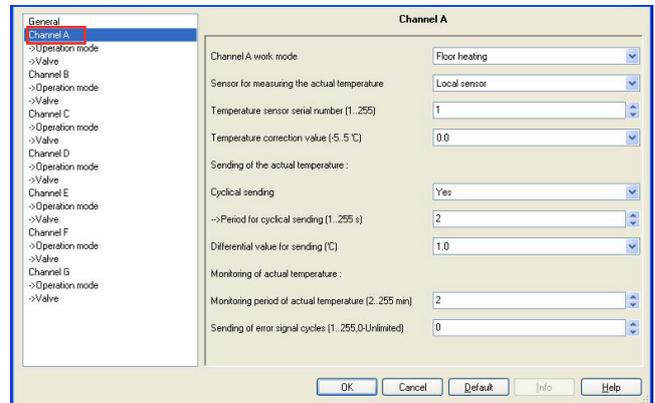
Fig. 34: "Channel A" floor heating parameter window

Each channel (A, B, C, D, E) ouput of the Floor heating are independent and the same. So, Understand only one channel ouput is enough. The following paragraph will description of the first channel output in detail.

• Channel A work mode

  Options: **Inactive**
  Floor heating
  Switch controller

Inactive: The channel inactive.

Floor heating: The channel is used to floor heating.

Switch controller: The channel is used to switch controller.

> If the channel select the floor heating, the following parameter will appears.

3. SOFTWARE (continued)

■ **3.4 Function parameter "Floor Heating" (continued)**

   3.4.1 Channel A (Floor heating) (continued)

   • **Sensor for measuring the actual temperature**

      Options: **Local sensor**
               Via KNX

Local sensor: The temperature sensor must be connected to the Fan Coil Unit Controller. One local temperature sensor corresponds to one channel. In this case, some parameters for local sensor become visible.
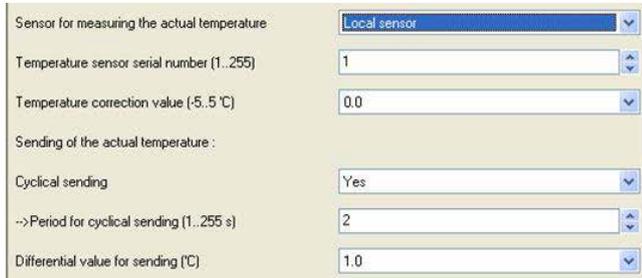
Fig. 35: Local sensor

Via KNX: The actual temperature is get from the other devices via KNX. One temperature sensor object corresponds to one channel. In this case, some parameters for KNX temperature sensor become visible.
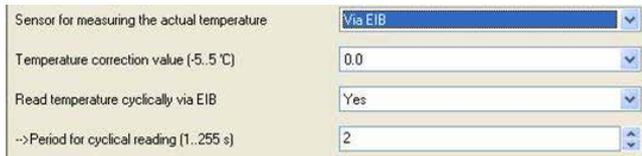
Fig. 36: Sensor via KNX   **3.**

   • **Local sensor:**
      -- **Temperature sensor serial number (1..255)**
         Options: **1..255**

Each temperature sensor TS/C 1.0 has a serial number. The number is the temperature sensor's address and can not same on the 0 490 41.

      -- **Temperature correction value (-5..5°C)**
         Options: **-5..5**

Correction of the value measured by the temperature sensor.

   • **Sending of the actual temperature:**
      -- **Cyclical sending**
         Options: **NO**
                  YES

NO: Don't sending the actual local temperature to the KNX.

YES: Sending the actual local temperature to the KNX.

Activation of the cyclical transmission function for the actual local temperature. This parameter is only visible if the option "Local sensor" is set for the parameter **Sensor for measuring the actual temperature**. The following parameters are visible:

      -- **Period for cyclical sending (1..255s)**
         Options: **1..255s**

Setting the cyclical transmission period for the actual temperature.

      -- **Differential value for sending (°C)**
         Options: **0.5**
                  1.0
                  1.5
                  2.0
                  2.5
                  3.0

Setting the temperature change at which the actual temperature is sent in addition to being sent after a change in value.

3. SOFTWARE (continued)

■ **3.4 Function parameter "Floor Heating" (continued)**

   3.4.1 Channel A (Floor heating) (continued)

   • **Via KNX:**

      -- **Temperature correction value (-5..5°C)**
         Options: **-5..5**

Correction of the value measured by the actual temperature received via the KNX.

      -- **Read temperature cyclically via KNX**
         Options: **NO**
                  YES

NO: Does not read temperature via KNX.

YES: Read temperature cyclically via KNX.

Activation of the cyclical reading function for the actual temperature via KNX. This parameter is only visible if the option "Via KNX" is set for the parameter **Sensor for measuring the actual temperature**.

      -- **Period for cyclical reading (1..255s)**
         Options: **1..255s**

Setting the cyclical reading period for the actual temperature via KNX.

   • **Monitoring of actual temperature:**
      -- **Monitoring period of actual temperature (2..255min)**
         Options: **2..255min**

Setting the monitoring period for the actual temperature (local and via the KNX).

      -- **Sending of error signal cycles (1..255,0-Unlimited)**
         Options: **0..255 (0)**

For setting the send repetition in the event of an error message. If the option "1..255" is selected, the error signal is only sent 1..255 counts if there is a change in the object value. If the option "0-Unlimited" is set, the object value is sent according to the parameterised **Monitoring period of actual temperature (2..255 min)**.

   3.4.1.1 Operation mode
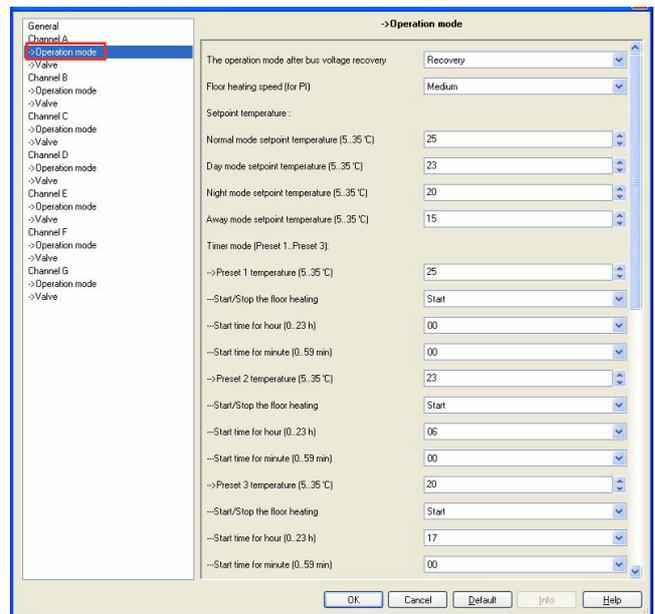
Fig. 37: "Operation mode" floor heating parameter window

The parameters are the channel A's floor heating functions.

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3. SOFTWARE (continued)

■ **3.4 Function parameter "Floor Heating" (continued)**

3.4.1 Channel A (Floor heating) (continued)

3.4.1.1 Operation mode (continued)

• The operation mode after bus voltage recovery

After bus voltage recovery channel A's operation modes.

> Options: **Recovery**
> **Normal**
> **Day**
> **Night**
> **Away**
> **Timer**

Recovery: After bus voltage recovery the mode which existed before bus voltage failure is set.

Normal, Day, Night, Away, Time: Each operation mode has different setpoint temperature, you can select the operation mode with the actual situation.

• Floor heating speed (for PI)

if you have sufficient knowledge in heating technology so that the appropriate settings are carried out correctly. The options are suitable for standard applications.

> Options: **Lower**
> **Low**
> **Medium**
> **Fast**
> **Faster**

Setting the PI controller response for heating. There is 5 speeds for the heating.

• Setpoint temperature:

-- Normal mode setpoint temperature (5..35°C)

-- Day mode setpoint temperature (5..35°C)

-- Night mode setpoint temperature (5..35°C)

-- Away mode setpoint temperature (5..35°C)

> Options: **5..35**

Setting the floor heating's setpoint temperature. Each operation mode has different setpoint temperature. When you want to change the room temperature only need a simple change operating mode can change to the corresponding temperature.

• Timer mode (Preset 1..Preset 3):

Setting the floor heating's timer mode preset (Preset 1, Preset 2, Preset 3). Each timer mode preset set a different temperature and different start time. When the slave clock running to any of the preset time, it is working to the corresponding preset mode.
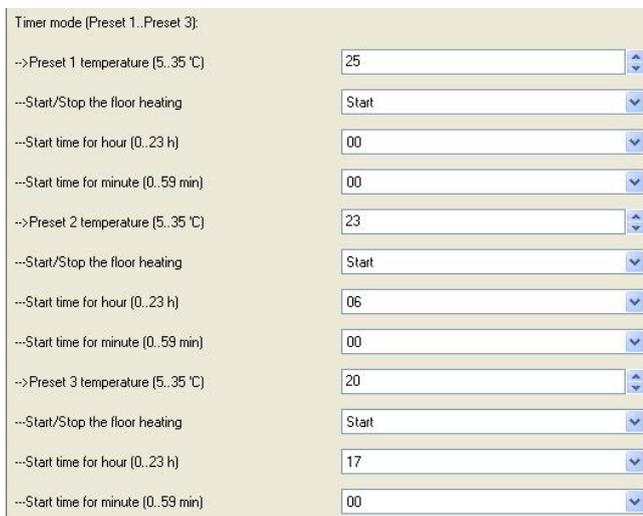
Fig. 38: Timer mode

Preset 2 and preset 3's settings are same as preset 1.

3. SOFTWARE (continued)

■ **3.4 Function parameter "Floor Heating" (continued)**

3.4.1 Channel A (Floor heating) (continued)

3.4.1.1 Operation mode (continued)

• Timer mode (Preset 1..Preset 3): (continued)

-- Preset 1 temperature (5..35°C)

-- Preset 2 temperature (5..35°C)

-- Preset 3 temperature (5..35°C)

> Options: **5..35**

24 hours a day is divided into three preset time corresponding three temperature point, so it in different period of time can automatic switching to different temperature.

-- Start/Stop the floor heating

> Options: **Stop**
> **Start**

Start or stop the floor heating in current slave clock.

-- Start time of hour (0..23h)

> Options: **0..23**

Setting the start time of hour for the preset 1 (2,3).

-- Start time of minute (0..59min)

> Options: **0..59**

Setting the start time of minute for the preset 1 (2,3).

3.4.1.2 Valve
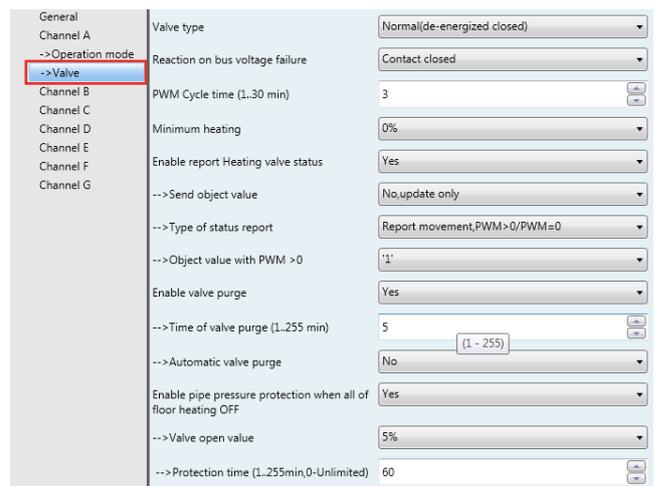
Fig. 39: "Valve" floor heating parameter window

• Valve type

> Options: **Inverted (de-energized opened)**
> **Normal (de-energized closed)**

Setting the control direction of the valve.

• Reaction on bus voltage failure

Setting the valve position after the bus voltage failure.

> Options: **Contact unchanged**
> **Contact open**
> **Contact closed**

Contact unchanged: The valve remains unchanged at bus voltage failure.

Contact open: The valve remains opened at bus voltage failure.

Contact closed: The valve remains closed at bus voltage failure.

| 3. SOFTWARE (continued) | 3. SOFTWARE (continued) |

■ **3.4 Function parameter "Floor Heating" (continued)**

   3.4.1 Channel A (Floor heating) (continued)

   3.4.1.2 Valve (continued)

   • **Reaction on bus voltage failure (continued)**

   PWM Cycle time (1..30min)
This is used to set the cycle time of the PWM control.

   Options: **1..30min**

An actuation cycle consists of one on and one off process and forms a PWM period. Example: Actuating value = 20%, PWM time = 10 min: In an actuating cycle of 10 min, 2 min switched on and 8 min switched off (i.e. 20% on/ 80% off).

   • **Minimum heating**

   Options: **0%, 5%, 10%. 15%, 20%**

Minimum permissible valve setting with actuating value.

   • **Enable report heating valve status**

   Options: **NO**
       Yes

NO: there is not response.

Yes: it response the valve position status.

If you select yes, The following parameters appear:

   -- **Send object value**

   Options: **No, update only**
       Only after change

No, update only: The status is always updated but not sent.

Only after change: Status changes are sent to the status bit on the KNX.

   -- **Type of status report**

   Options: **Report movement PWM>0/PWM=0 ; Status ON as long as PWM control is active**
       Report position ON/OFF: The status recopies the state of the valve

   • **Enable valve purge**

   Options: **NO**
       Yes

NO: Disable valve purge.

YES: The 1 bit Trigger valve purge communication object is enabled.

With this parameter, the function of a valve purge of the output can be enabled. Regular purging of a heating valve can prevent deposits from forming in the valve area and restricting the valve function. At the same time it is assured that the heating element is purged which simplifies the bleeding of trapped air. This is particularly important at times when the valve position does not change very much. The valve is opened to the maximum during a valve purge. It can be triggered via the object **Trigger valve purge** and/or automatically at adjustable intervals. With the option YES, the objects **Trigger valve purge** and **Status valve purge** are enabled. Also the parameter **Time of valve purge in minutes (1...255)** and **Automatic valve purge** are enabled.

Fig. 40: Valve purge

   -- **Time of valve purge (1..255min)**

   Options: **1..255min**

Set the time for the valve purge. In this time the valve is fully opened. When the time has elapsed, the state before the purge is re-established.

■ **3.4 Function parameter "Floor Heating" (continued)**

   3.4.1 Channel A (Floor heating) (continued)

   3.4.1.2 Valve (continued)

   -- **Automatic valve purge**

Set the automatic valve purge frequency.

   Options: **NO**
       One times per day
       One times per week
       One times per month

One times per day: Automatic valve purge every day.

One times per week: Automatic valve purge every week.

One times per month: Automatic valve purge every month.

A purge can be initiated by the object **Trigger valve purge**. The counter for automatic purging starts to run when the parameter is loaded in the actuator.

The time is reset each time it is downloaded. The time is reset as soon as purging is completed. This can occur either through automatic purging or via the object **Trigger valve purge**.

   • **Enable pipe pressure protection when all of floor heating OFF**

   Options: **NO**
       Yes

NO: Disable this channel pipe pressure protection.

YES: Enable this channel pipe pressure protection when all of room floor heating turn off.

When all of room floor heating turn off, pipe pressure will increase, easy to cause the damage, so must carry on the timing of the reduced pressure, this process in order to prevent a room temperature is too high, and each channel can timing take turns exhaust pressure work. At the same time only one channel will be open. When one of the room floor heating is turn on, all of the pipe pressure protection will end.

   -- **Valve open value**

   Options: **5%**
       10%
       15%
       20%
       25%
       30%

Setting the valve's position open value.

3. SOFTWARE (continued)

■ 3.4 Function parameter "Floor Heating" (continued)

3.4.1 Channel A (Floor heating) (continued)

3.4.1.2 Valve (continued)

• Enable pipe pressure protection when all of floor heating OFF (continued)

-- Protection time (1..255min, 0-Unlimited)

Options: **0-Unlimited**
1..255min

A channel to protect time, when time end turn to the next channel reduced pressure protection. If the option "1..255 min" is selected, the channel is only working 1..255 min then turn to the next channel. If the option "0-Unlimited" is set, the channel is working all the time until one of the room turn on the floor heating.

The floor heating parameter windows "Channel A, B, C, D, E, F, G", "Operation mode" and "Valve" with the parameter of control functions are largely similar.

Only the following functions channel F, G's valve differ from channel A, B, C, D, E's valve.
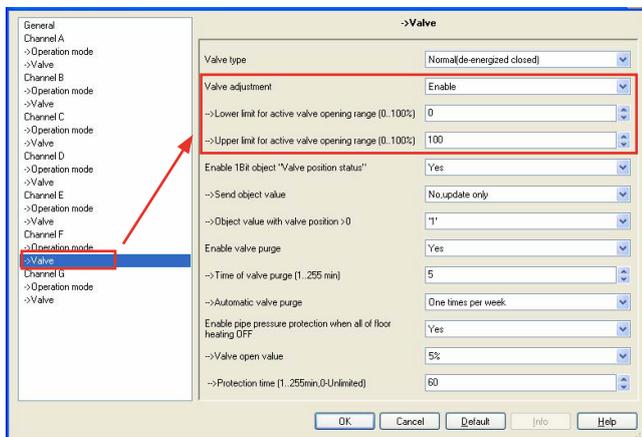
Fig. 41: "Valve" floor heating channel F, G parameter window

• Valve adjustment

User-defined adjustment of the valve characteristics.

Options: **Disable**
Enable

Disable: Disable the valve adjustment.

Enable: Enable the valve adjustment.

Only select the option "Enable" if you have sufficient knowledge in heating technology so that the appropriate settings are carried out correctly. The option "Disable" is suitable for standard applications.

-- **Lower limit for active valve opening range (0..100%)**

-- **Upper limit for active valve opening range (0..100%)**

Options: **0..100%**

For setting the valve characteristic curve i.e. the valve position dependent on the control value.

4. COMMUNICATION OBJECTS DESCRIPTION

In this section will introduce the communication objects, The objects will show by setting the function enable. In the Fan/Fan coil controller: **fan**, **Heating** or **Cooling** communication objects are the same with **Heating and cooling**. So, the following paragraph will description of the **Heating and cooling** and **Floor heating** communication objects in detail.

■ 4.1 Objects "General"

Number	Name	Object Function	Description	Gro...	Length	C	R	W	T	U	D..	Priority
0	General	Send cycles			1 bit	C	R	-	T	-		Low

NO.	Function	Object name	Data type	Flags
0	**Send cycles**	**General**	DPT 1.003 1bit	**C R T**

This communication object is always active and valid. invert the value send telegram to bus in next frame. e.g. last telegram value is "**1**", the next telegram value is "**0**"

■ 4.2 Fan/Fan coil controller

4.2.1 Objects "Actual temperature"

	Number	Name	Object Function		Length	C	R	W	T	U		Priority
	10	Actual temperature	Actual temperature 1		2 Byte	C	R	W	T	U		Low
	11	Actual temperature	Actual temperature 2		2 Byte	C	R	W	T	U		Low
	12	Actual temperature	Actual temp. 1 error signal		1 bit	C	R	-	T	-		Low
	13	Actual temperature	Actual temp. 2 error signal		1 bit	C	R	-	T	-		Low
	14	Actual temperature	Frost/heat alarm error signal		1 bit	C	R	-	T	-		Low

NO.	Function	Object name	Data type	Flags
10	**Actual temperature 1**	**Actual temperature**	DPT 9.0011bit 2 byte	**C R W T U**

If the Fan Coil Unit Controller is operated with the temperature sensor TS/C 1.0 connected, the actual temperature is sent to this communication object via the KNX. Cyclical sending can also be set in the parameters. The parameterized Temperature 1 Correction value is included.
If the Fan Coil Unit Controller is operated without the temperature sensor, it receives the actual temperature via the KNX at this communication object.

NO.	Function	Object name	Data type	Flags
11	**Actual temperature 2**	**Actual temperature**	DPT 9.001 2 byte	**C R W T U**

This object is only visible if the option "Two sensor via KNX (Count = 2)" is selected, it receives the actual temperature via the KNX at this communication object.

NO.	Function	Object name	Data type	Flags
12	**Actual temp. 1 error signal**	**Actual temperature**	DPT 1.005 1bit	**C R T**

An error signal can be sent to the KNX with this object if the space temperature 1 has not been refreshed within a set period. The output of the error signal can occur 1..255 or cyclically.
Telegram value: "**0**": No error
"**1**": Error

NO.	Function	Object name	Data type	Flags
13	**Actual temp. 2 error signal**	**Actual temperature**	DPT 1.005 1bit	**C R T**

An error signal can be sent to the KNX with this object if the space temperature 2 has not been refreshed within a set period. The output of the error signal can occur 1..255 or cyclically.
Telegram value: "**0**": No error
"**1**": Error

NO.	Function	Object name	Data type	Flags
14	**Frost/heat alarm error signal**	**Actual temperature**	DPT 1.005 1bit	**C R T**

The Fan Coil Controller sends information via this communication object about whether frost protection mode is active.
Telegram value: "**0** ": No frost/heat protection
"**1**": Frost/heat protection

4. COMMUNICATION OBJECTS DESCRIPTION (continued)

■ **4.2 Fan/Fan coil controller (continued)**

4.2.2 Objects "Setpoint"

▦20	Setpoint	Base setpoint temperature	2 Byte	C	R	W	T	U	Low
▦21	Setpoint	Instantaneous setpoint temp.	2 Byte	C	R	-	T	-	Low

NO.	Function	Object name	Data type	Flags
20	Base setpoint temperature	Setpoint	DPT 9.001 2 byte	C R W T U

The base setpoint value can be modified via this input. It is stored in non-volatile memory.

NO.	Function	Object name	Data type	Flags
21	Instantaneous setpoint temp.	Setpoint	DPT 9.001 2 byte	C R T

The current setpoint (base setpoint including the reduction/increase in standby mode or during night mode) can be read out from this communication object.

4.2.3 Objects "HVAC control mode"

▦25	HVAC control mode	HVAC control mode (byte)	1 Byte	C	R	W	T	U	Low
▦26	HVAC control mode	Automatic heating/cooling mode	1 bit	C	R	W	T	U	Low
▦27	HVAC control mode	Activation of heating mode	1 bit	C	R	W	T	U	Low
▦28	HVAC control mode	Activation of cooling mode	1 bit	C	R	W	T	U	Low
▦29	HVAC control mode	Activation of fan only	1 bit	C	R	W	T	U	Low

NO.	Function	Object name	Data type	Flags
24	HVAC control mode (byte)	HVAC control mode	DPT 20.105 1 byte	C R W T U

HVAC control mode conversion. Only the following telegram value is effective.

Telegram value: "**0**": Auto
"**1**": Heat
"**3**": Cool
"**6**": Off
"**9**": Fan only

NO.	Function	Object name	Data type	Flags
25	Automatic heating/cooling mode	HVAC control mode	DPT 1.003 1 bit	C R W T U

These communication objects are only visible if the option "4-pipe system" is set in the parameter HVAC-System. According to the actual temperature heating mode and cooling mode will automatically switching.

Telegram value: "**0**": No function
"**1**": Automatic heating/cooling mode

NO.	Function	Object name	Data type	Flags
26	Activation of heating mode	HVAC control mode	DPT 1.003 1 bit	C R W T U

Heating mode is activated via these communication objects.

Telegram value: "**0**": No function
"**1**": Heating mode

NO.	Function	Object name	Data type	Flags
27	Activation of cooling mode	HVAC control mode	DPT 1.003 1bit	C R W T U

Cooling mode is activated via these communication objects.

Telegram value: "**0**": No function
"**1**": Cooling mode

NO.	Function	Object name	Data type	Flags
28	Activation of OFF mode	HVAC control mode	DPT 1.003 1bit	C R W T U

Telegram value: "**0**": No function
"**1**": OFF mode

NO.	Function	Object name	Data type	Flags
29	Activation of fan only	HVAC control mode	DPT 1.003 1bit	C R W T U

Fan only mode is activated via these communication objects.

Telegram value: "**0**": No function
"**1**": Fan only mode

> **Note:**
> If a "1" is received at above communication objects, the final value received is definitive.

4. COMMUNICATION OBJECTS DESCRIPTION (continued)

■ **4.2 Fan/Fan coil controller (continued)**

4.2.4 Objects "HVAC mode"

▦30	HVAC mode	HVAC mode (byte)	1 Byte	C	R	W	T	U	Low
▦31	HVAC mode	ON CMD for comfort mode	1 bit	C	R	W	T	U	Low
▦32	HVAC mode	ON CMD for standby mode	1 bit	C	R	W	T	U	Low
▦33	HVAC mode	ON CMD for night mode	1 bit	C	R	W	T	U	Low
▦34	HVAC mode	ON CMD for building protection	1 bit	C	R	W	T	U	Low

NO.	Function	Object name	Data type	Flags
30	HVAC mode (byte)	HVAC mode	DPT 20.102 1 byte	C R W T U

Input object shall be used to the HVAC Mode.
Telegram value: "**1**": Comfort mode
"**2**": Standby mode
"**3**": Night mode
"**4**": building protection

NO.	Function	Object name	Data type	Flags
31	ON CMD for comfort mode	HVAC mode	DPT 1.001 1 bit	C R W T U

The Fan Coil Controller is switched to comfort mode via this communication object. If the device has been switched from comfort mode to night mode, the comfort extension is activated for the duration of the parameterized Extended comfort mode time by a telegram at this communication object. The comfort extension is restartedvby each subsequent telegram.
Telegram value: "**0**": No function
"**1**": Comfort mode/comfort extension

NO.	Function	Object name	Data type	Flags
32	ON CMD for standby mode	HVAC mode	DPT 1.001 1 bit	C R W T U

Input object for switching to standby mode.
Telegram value: "**0**": No function
"**1**": Standby mode

NO.	Function	Object name	Data type	Flags
33	ON CMD for night mode	HVAC mode	DPT 1.001 1bit	C R W T U

Input object for switching to night mode.
Telegram value: "**0**": No function
"**1**": Night mode

NO.	Function	Object name	Data type	Flags
34	ON CMD for building protection	HVAC mode	DPT 1.001 1bit	C R W T U

Input object for switching to building protection mode.
Telegram value: "**0**": No function
"**1**": building protection mode

NO.	Function	Object name	Data type	Flags
36	Dew point alarm	HVAC alarm	DPT 1.001 1bit	C R W T U

Telegram value: "**0**": No function
"**1**": alarm

NO.	Function	Object name	Data type	Flags
37	Condensate water alarm	HVAC alarm	DPT 1.001 1bit	C R W T U

Telegram value: "**0**": No function
"**1**": alarm

> **Note:**
> If a "1" is received at above communication objects, the final value received is definitive.

4. COMMUNICATION OBJECTS DESCRIPTION (continued)

■ **4.2 Fan/Fan coil controller (continued)**

4.2.5 Objects "Fan"

40	Fan	Fan speed automatic	1 bit	C - W - U	Low
41	Fan	Fan speed with % value	1 Byte	C - W - U	Low
42	Fan	Fan speed 1	1 bit	C - W - U	Low
43	Fan	Fan speed 2	1 bit	C - W - U	Low
44	Fan	Fan speed 3	1 bit	C - W - U	Low

NO.	Function	Object name	Data type	Flags
40	**Fan speed automatic**	**Fan**	**DPT 1.003 1 bit**	**C W U**

If fan speed automatic mode is activated, it will be activated on this communication object with the value "**1**" after a download, bus reset or via a telegram. Automatic mode is switched off, if a signal is received on this communication object with the value "**0**" , a Fan speed with % value or Fan speed 1 (2,3) communication object. Fan speed limitation only used for fan speed automatic mode.

NO.	Function	Object name	Data type	Flags
41	**Fan speed with % value**	**Fan**	**DPT 5.001 1 byte**	**C W U**

With the coding below combinations of devices with different number of steps is possible. The stop of the actuator is defined and the highest speed of the controller always results in highest speed of the actuator. Steps in between are interpreted to the best. Fan speed automatic mode becomes inactive.

1-Speed		
Speed	Percent (%)	Value
0	0	0
I	1 - 100	1 - 255

2-Speed		
Speed	Percent (%)	Value
0	0	0
I	1 - 50	1 - 128
ii	51 - 100	129 - 255

3-Speed		
Speed	Percent (%)	Value
0	0	0
I	1 - 33	1- 85
ii	34 - 67	86 - 170
iii	68 - 100	171 - 255

NO.	Function	Object name	Data type	Flags
42	**Fan speed 1**	**Fan**	**DPT 1.001 1 bit**	**C W U**
43	**Fan speed 2**	**Fan**	**DPT 1.001 1bit**	**C W U**
44	**Fan speed 3**	**Fan**	**DPT 1.001 1bit**	**C W U**

Via the 1 bit communication object the Fan Coil Actuator can receive a control value for fan speed x (x = 1,2,3). Automatic operation is disabled. A renewed activation occurs via the communication objects Fan speed automatic. If several ON commands "**1**" are received by the various fan speed objects, the value that was last received for the fan control is decisive. This also applies for the OFF command "**0**". If the actuator for a speed that has been switched off receives another OFF command, it is carried out, i.e. a speed that is currently switched on is switched off, even though the corresponding fan speed object does not act directly on the speed. The last command – in this case the OFF command of another speed – is always executed.
Telegram value: "**0**" = Fan OFF
　　　　　　　"**1**": Fan speed x ON

4. COMMUNICATION OBJECTS DESCRIPTION (continued)

■ **4.2 Fan/Fan coil controller (continued)**

4.2.6 Objects "Fan status"

45	Fan	Status fan speed 1	1 bit	C R - T -	Low
46	Fan	Status fan speed 2	1 bit	C R - T -	Low
47	Fan	Status fan speed 3	1 bit	C R - T -	Low
48	Fan	Status fan speed	1 Byte	C R - T -	Low
49	Fan	Status fan On/Off	1 bit	C R - T -	Low
50	Fan	Status fan speed automatic	1 bit	C R - T -	Low

NO.	Function	Object name	Data type	Flags
45	**Status fan speed 1**	**Fan**	**DPT 1.001 1 bit**	**C R T**
46	**Status fan speed 2**	**Fan**	**DPT 1.001 1 bit**	**C R T**
47	**Status fan speed**	**Fan**	**DPT 1.001 1 bit**	**C R T**

These objects are enabled if the parameter Enable 1bit object "Status fan speed x" is enabled in the parameter window Function status. It can be parameterised (see parameter window Function status) whether the object value is only updated, always sent on the KNX or only sent after a change. It can be parameterised for the status to indicate a current fan speed or a required fan speed. With this object, is possible to display the fan speed in a visualisation program or to indicate it using a diode.
Telegram value: "**0**"= fan speed OFF
　　　　　　　"**1**"= fan speed ON

NO.	Function	Object name	Data type	Flags
48	**Status fan speed**	**Fan**	**DPT 5. 010 1 byte**	**C R T**

This object is enabled if the parameter Enable 1-byte object "Status fan speed" is enabled in the parameter window Function status. It can be parameterised (see parameter window Function status) whether the object value is only updated, always sent on the KNXor only sent after a change. It is possible to parameterise if the actual or required speed are displayed with the status object. With this object it is possible for example to display the fan speed on the display as a direct numerical value.

The following telegram values apply for the 1-byte object:

Numerical value	Hexadecimal	Binary value	Speed
0	00	00000000	0 (off)
1	01	00000001	Speed 1
2	02	00000010	Speed 2
3	03	00000011	Speed 3

NO.	Function	Object name	Data type	Flags
49	**Status fan On/Off**	**Fan**	**DPT 1. 001 1 bit**	**C R T**

This object is enabled if the parameter Enable 1Bit object "Status fan On/Off" is enabled in the parameter window Function status. It is possible to parameterise if an object value is only updated, always sent on the KNX or only sent after a change.
Telegram value: "**0**" = fan speed OFF
　　　　　　　"**1**"= fan speed ON

NO.	Function	Object name	Data type	Flags
50	**Status fan speed automatic**	**Fan**	**DPT 1.003 1 bit**	**C R T**

This object is enabled if the parameter Enable 1Bit object "Status fan speed automatic" is enabled in the parameter window Function status. It is possible to parameterise if an object value is only updated, always sent on the KNX or only sent after a change. The object indicates the status of the fan speed automatic mode.
Telegram value: "**0**"= inactive
　　　　　　　"**1**"= activated

4. COMMUNICATION OBJECTS DESCRIPTION (continued)

■ **4.2 Fan/Fan coil controller (continued)**

4.2.7 Objects "Fan limitation"

51	Fan	Limitation 1		1 bit	C	R	W	T	U	Low
52	Fan	Limitation 2		1 bit	C	R	W	T	U	Low
53	Fan	Limitation 3		1 bit	C	R	W	T	U	Low
54	Fan	Limitation 4		1 bit	C	R	W	T	U	Low

NO.	Function	Object name	Data type	Flags
51	Limitation 1	Fan	DPT 1.003 1 bit	C R W T U
52	Limitation 2	Fan	DPT 1.003 1 bit	C R W T U
53	Limitation 3	Fan	DPT 1.003 1 bit	C R W T U
54	Limitation 4	Fan	DPT 1.003 1 bit	C R W T U

These objects are enabled if the parameter Enable limitations (Automatic fan control) is enabled in the parameter window Fan (Relay) or Fan (0-10v). The limitation x (x = 1,2,3,4) is active if a telegram with the value "1"is received on the communication object Limitation x. All the Limitation x is deactivated if a telegram with the value "0"is received on the communication object Limitation x. When Limitation x is activated, the fan can only assume the set fan speed or fan speed range in the parameter window Fan (Relay) or Fan (0-10v). The valve position is independently programmable from the fan limitation. If several Enable commands "1"are received by the various limitation objects, the value that was last received for the fan speed limitation control is decisive. This also applies for the Disable command '0'. If the fan speed for a limitation function that has been inactive receives another Disable command, it is carried out, i.e. a limitation function that is currently is inactive, even though the corresponding limitation function object does not act directly on the limitation object. The last command – in this case the Disable command of another limitation object– is always executed.

Telegram value: "**0**"= All limitation disable
 "**1**"= limitation x enable

4.2.8 Objects "Valve Heating"

60	Valve Heating	Status valve position		1 bit	C	R	-	T	-	Low
61	Valve Heating	Trigger valve purge		1 bit	C	-	W	-	U	Low
62	Valve Heating	Status valve purge		1 bit	C	R	-	T	-	Low

NO.	Function	Object name	Data type	Flags
60	Status valve position	Valve heating	DPT 1.001 1 bit	C R T

This communication object is visible if the parameter window Enable 1Bit object "Heating valve position status" is enabled in the parameter window Function status.
The status of the valve position is visible via this communication object. Hereby, the target position where the valve should move to is always transferred. If the value "1"is set in the parameter "Object value with valve position >0":
Telegram value: "**0**"= Valve position equal to zero
 "**1**"= Valve position not equal to zero

If the value "0"is set in the parameter "Object value with valve position >0":
Telegram value: "**0**"= Valve position not equal to zero
 "**1**"= Valve position equal to zero

NO.	Function	Object name	Data type	Flags
61	Trigger valve purge	Valve Heating	DPT 1.017 1 bit	C W U

The heating valve purge is triggered using this communication object. The purge cycle with automatic purge will be restarted.

Telegram value: "**0**"= end valve purge, valve will be closed
 "**1**"= start valve purge, valve will be opened

4. COMMUNICATION OBJECTS DESCRIPTION (continued)

■ **4.2 Fan/Fan coil controller (continued)**

4.2.8 Objects "Valve Heating" (continued)

NO.	Function	Object name	Data type	Flags
62	Status valve purge	Valve heating	DPT 1.003 1 bit	C R T

The status of the heating valve purge is visible via this communication object.
Telegram value: "**0**"= valve purge not active
 "**1**"= valve purge active

4.2.9 Objects "Valve Cooling"

63	Valve Cooling	Status valve position		1 bit	C	R	-	T	-	Low
64	Valve Cooling	Trigger valve purge		1 bit	C	-	W	-	U	Low
65	Valve Cooling	Status valve purge		1 bit	C	R	-	T	-	Low

NO.	Function	Object name	Data type	Flags
65	Status valve position	Valve Cooling	DPT 1.001 1 bit	C R T

This communication object is visible if the parameter window Enable 1Bit object "Cooling valve position status" is enabled in the parameter window Function status.
The status of the valve position is visible via this communication object. Hereby, the target position where the valve should move to is always transferred.
If the value "1"is set in the parameter "Object value with valve position >0":
Telegram value: "**0**"= Valve position equal to zero
 "**1**"= Valve position not equal to zero

If the value "0"is set in the parameter "Object value with valve position >0":

Telegram value: "**0**"= Valve position not equal to zero
 "**1**"= Valve position equal to zero

NO.	Function	Object name	Data type	Flags
66	Trigger valve purge	Valve cooling	DPT 1.017 1 bit	C W U

The cooling valve purge is triggered using this communication object. The purge cycle with automatic purge will be restarted.
Telegram value: "**0**"= end valve purge, valve will be closed
 "**1**"= start valve purge, valve will be opened

NO.	Function	Object name	Data type	Flags
67	Status valve purge	Valve Cooling	DPT 1.003 1 bit	C R T

The status of the cooling valve purge is visible via this communication object.
Telegram value: "**0**"= valve purge not active
 "**1**"= valve purge active

4.2.10 Objects "HVAC Control status"

NO.	Function	Object name	Data type	Flags
70	Status of control mode	HVAC Control status	DPT 20.105 1 Byte	C R T

COOL: $03, HEAT: $01, OFF MODE: $06, FAN ONLY, $09, AUTO: $00

NO.	Function	Object name	Data type	Flags
71	Status of automatic mode	HVAC Control status	DPT 1.003 1 Bit	C R T
72	Status of heating mode	HVAC Control status	DPT 1.003 1 Bit	C R T
73	Status of cooling mode	HVAC Control status	DPT 1.003 1 Bit	C R T
74	Status of off mode	HVAC Control status	DPT 1.003 1 Bit	C R T
75	Status of fan only	HVAC Control status	DPT 1.003 1 Bit	C R T

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4. COMMUNICATION OBJECTS DESCRIPTION (continued)

■ 4.2 Fan/Fan coil controller (continued)

4.2.11 Objects "HVAC Operation status"

NO.	Function	Object name	Data type	Flags
80	Status of operation mode	HVAC Operation status	DPT 20.102 1 Byte	C R T
81	Status of comfort mode	HVAC Operation status	DPT 1.001 Bit	C R T
82	Status of STANDBY mode	HVAC Operation status	DPT 1.001 Bit	C R T
83	Status of NIGHT mode	HVAC Operation status	DPT 1.001 Bit	C R T
84	Status of building protection	HVAC Operation status	DPT 1.001 Bit	C R T

4.2.12 Object "HVAC mode status"

NO.	Function	Object name	Data type	Flags
90	HVAC status	HVAC mode status	DPT 5.010 1 Byte	C R T

HEATING: Night $24, Standby $22, Protection $28, Comfort $21

COOLING: Night $04, Standby $02, Protection $08, Comfort $01

■ 4.3 Floor heating

4.3.1 Objects "Slave clock"

The local clock of slave system clock shall be synchronised by reception of a 'System Clock' information from the master system clock.

1	Slave clock	Network datetime	8 Byte	C - W T U	Low
2	Slave clock	Network date	3 Byte	C - W T U	Low
3	Slave clock	Network time of day	3 Byte	C - W T U	Low

NO.	Function	Object name	Data type	Flags
1	Network datetime	Slave clock	DPT 19.001 8 byte	C W T U

Input time & date information synchronisation of clocks in the system

NO.	Function	Object name	Data type	Flags
2	Network date	Slave clock	DPT 11.001 3 byte	C W T U

Input for date synchronisation of clocks in the system.

NO.	Function	Object name	Data type	Flags
3	Network time of day	Slave clock	DPT 10.001 3 byte	C W T U

Input for time synchronisation of clocks in the system.

4.3.2 Objects "Pipe pressure protection"

4	Floor heating	Pipe pressure protection	1 bit	C R - T -	Low

NO.	Function	Object name	Data type	Flags
4	Pipe pressure protection	Floor heating	DPT 1.001 1 blt	C R T

This communication object is used for pipe pressure protection. If all of the floor heating channel are turn off, this object status is sent ON, then the response status value is "**1**", Otherwise the status value is "**0**".

4. COMMUNICATION OBJECTS DESCRIPTION (continued)

4.3.3 Objects "Floor heating N"

In this section will introduce the floor heating N communication objects, The objects will show by setting the floor heating N function enable.

> **Note:**
>
> In following sections the N=A, B, C, D, E, F, G.

5	Floor heating A	Actual temperature	2 Byte	C R W T U	Low
6	Floor heating A	Actual temp. error signal	1 bit	C R - T -	Low
7	Floor heating A	Normal-mode setpoint Temp.	2 Byte	C R W T U	Low
8	Floor heating A	Day-mode setpoint Temp.	2 Byte	C R W T U	Low
9	Floor heating A	Night-mode setpoint Temp.	2 Byte	C R W T U	Low
10	Floor heating A	Away-mode setpoint Temp.	2 Byte	C R W T U	Low
11	Floor heating A	Preset 1 Temp. for timer mode	2 Byte	C R W T U	Low
12	Floor heating A	Time of day for preset 1	3 Byte	C R W T U	Low
13	Floor heating A	Start/Stop heating for preset1	1 bit	C R W T U	Low
14	Floor heating A	Preset 2 Temp. for timer mode	2 Byte	C R W T U	Low
15	Floor heating A	Time of day for preset 2	3 Byte	C R W T U	Low
16	Floor heating A	Start/Stop heating for preset2	1 bit	C R W T U	Low
17	Floor heating A	Preset 3 Temp. for timer mode	2 Byte	C R W T U	Low
18	Floor heating A	Time of day for preset 3	3 Byte	C R W T U	Low
19	Floor heating A	Start/Stop heating for preset3	1 bit	C R W T U	Low
20	Floor heating A	Floor heating(1-ON,0-OFF)	1 bit	C R W T U	Low
21	Floor heating A	ON CMD for Normal-mode	1 bit	C R W T U	Low
22	Floor heating A	ON CMD for Day-mode	1 bit	C R W T U	Low
23	Floor heating A	ON CMD for Night-mode	1 bit	C R W T U	Low
24	Floor heating A	ON CMD for Away-mode	1 bit	C R W T U	Low
25	Floor heating A	ON CMD for Timer-mode	1 bit	C R W T U	Low
26	Floor heating A	Status valve position	1 bit	C R - T -	Low
27	Floor heating A	Trigger valve purge	1 bit	C - W - U	Low
28	Floor heating A	Status valve purge	1 bit	C R - T -	Low
29	Floor heating A	Instantaneous setpoint temp.	2 Byte	C R - T -	Low

NO.	Function	Object name	Flags	Data type
5, 30..	Actual temperature	Floor heating N	DPT 9.001 2 byte	C R W T U

If the Floor heating N is operated with the temperature sensor TS/C 1.0 connected, the actual temperature is sent to this communication object via the KNX. Cyclical sending can also be set in the parameters. The parameterized Temperature 1 Correction value is included. If the Floor heating N is operated without the temperature sensor, it receives the actual temperature via the KNX at this communication object.

NO.	Function	Object name	Flags	Data type
6, 31..	Actual temp. error signal	Floor heating N	DPT 1.005 1 bit	C R T

An error signal can be sent to the KNX with this object if the space temperature has not been refreshed within a set period. The output of the error signal can occur 1..255 or cyclically.
Telegram value: "0": No error
        "1": Error

NO.	Function	Object name	Flags	Data type
7, 32..	Normal-mode setpoint Temp.	Floor heating N	DPT 9.001 2 byte	C R W T U

The Normal-mode setpoint temperature can be modified via this input. It is stored in non-volatile memory.

NO.	Function	Object name	Flags	Data type
8, 33..	Day-mode setpoint Temp.	Floor heating N	DPT 9.001 2 byte	C R W T U

The Day-mode setpoint temperature can be modified via this input. It is stored in non-volatile memory.

NO.	Function	Object name	Flags	Data type
9, 34..	Night-mode setpoint Temp.	Floor heating N	DPT 9.001 2 byte	C R W T U

The Night-mode setpoint temperature can be modified via this input. It is stored in non-volatile memory.

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4. COMMUNICATION OBJECTS DESCRIPTION (continued)

■ **4.3 Floor heating (continued)**

4.3.3 Objects "Floor heating N" (continued)

NO.	Function	Object name	Data type	Flags
10, 35..	Away-mode setpoint Temp.	Floor heating N	DPT 9.001 2 byte	C R W T U

The Away-mode setpoint temperature can be modified via this input. It is stored in non-volatile memory.

NO.	Function	Object name	Data type	Flags
11, 36..	Preset 1 Temp. for timer mode	Floor heating N	DPT 9.001 2 byte	C R W T U

The Time-mode preset 1 temperature can be modified via this input. It is stored in non-volatile memory.

12, 37..	Time of day for preset 1	Floor heating N	DPT 10.001 3 byte	C R W T U

The Time-mode preset 1 start time can be modified via this input. It is stored in non-volatile memory.

13, 38..	Start/Stop heating for preset 1	Floor heating N	DPT 1.010 1 bit	C R W T U

The Time-mode floor heating start or stop in this preset 1 time can be modified via this input. It is stored in non-volatile memory.

14, 39..	Preset 2 Temp. for timer mode	Floor heating N	DPT 9.001 2 byte	C R W T U

The Time-mode preset 2 temperature can be modified via this input. It is stored in non-volatile memory.

15, 40..	Time of day for preset 2	Floor heating N	DPT 10.001 3 byte	C R W T U

The Time-mode preset 2 start time can be modified via this input. It is stored in non-volatile memory.

16, 41..	Start/Stop heating for preset 2	Floor heating N	DPT 1.010 1 bit	C R W T U

The Time-mode floor heating start or stop in this preset 2 time can be modified via this input. It is stored in non-volatile memory.

17, 42..	Preset 3 Temp. for timer mode	Floor heating N	DPT 9.001 2 byte	C R W T U

The Time-mode preset 3 temperature can be modified via this input. It is stored in non-volatile memory.

18, 43..	Time of day for preset 3	Floor heating N	DPT 10.001 3 byte	C R W T U

The Time-mode preset 3 start time can be modified via this input. It is stored in non-volatile memory.

19, 44..	Start/Stop heating for preset3	Floor heating N	DPT 1.010 1 bit	C R W T U

The Time-mode floor heating start or stop in this preset 3 time can be modified via this input. It is stored in non-volatile memory.

20, 45..	Floor heating (1-ON, 0-OFF)	Floor heating N	DPT 1.001 1 bit	C R W T U

Floor heating N start working when the object receive the value is "1", and stop working when the object receive the value is "0".

21, 46..	ON CMD for Normal-mode	Floor heating N	DPT 1.001 1 bit	C R W T U

Input object for switching to Normal-mode.
Telegram value: "0": No function
　　　　　　 "1": Normal mode

22, 47..	ON CMD for Day-mode	Floor heating N	DPT 1.001 1 bit	C R W T U

Input object for switching to Day -mode.
Telegram value: "0": No function
　　　　　　 "1": Day mode

4. COMMUNICATION OBJECTS DESCRIPTION (continued)

■ **4.3 Floor heating (continued)**

4.3.3 Objects "Floor heating N" (continued)

NO.	Function	Object name	Data type	Flags
23, 48..	ON CMD for Night-mode	Floor heating N	DPT 1.001 1 bit	C R W T U

Input object for switching to Night -mode.
Telegram value: "0": No function
　　　　　　 "1": Night mode

24, 49..	ON CMD for Away-mode	Floor heating N	DPT 1.001 1 bit	C R W T U

Input object for switching to Away -mode.
Telegram value: "0": No function
　　　　　　 "1": Away mode

25, 50..	ON CMD for Timer-mode	Floor heating N	DPT 1.001 1 bit	C R W T U

Input object for switching to Timer -mode.
Telegram value: "0": No function
　　　　　　 "1": Timer mode

26, 51..	Status valve position	Floor heating N	DPT 1.001 1 bit	C R T

This communication object is visible if the parameter window Enable 1Bit object "Valve position status" is enabled in the parameter window Valve. The status of the valve position is visible via this communication object. Hereby, the target position where the valve should move to is always transferred.
If the value "1"is set in the parameter "Object value with valve position > 0":
Telegram value: "0"= Valve position equal to zero
"1"= Valve position not equal to zero
If the value "0"is set in the parameter "Object value with valve position > 0":
Telegram value: "0"= Valve position not equal to zero
"1"= Valve position equal to zero

27, 52..	Trigger valve purge	Floor heating N	DPT 1.017 1 bit	C W U

The Floor heating N valve purge is triggered using this communication object. The purge cycle with automatic purge will be restarted.
Telegram value: "0"= end valve purge, valve will be closed
　　　　　　 "1"= start valve purge, valve will be opened

28, 53..	Status valve purge	Floor heating N	DPT 1.003 1 bit	C R T

The status of the Floor heating N valve purge is visible via this communication object.
Telegram value: "0"= valve purge not active
　　　　　　 "1"= valve purge active

29, 54..	Instantaneous setpoint temp.	Floor heating N	DPT 9.001 2 byte	C R T

The instantaneous setpoint (current mode setpoint temperature) can be read out from this communication object.

■ **4.4 Switch actuator**

In this section will introduce the switch actuator communication objects, The objects will show by setting the switch actuator function enable.

> **Note:**
> In following sections the N=A, B, C, D, E.

4. COMMUNICATION OBJECTS DESCRIPTION (continued)

■ 4.4 Switch actuator (continued)

4.4.1 Objects "Output N"

180	Output A	Channel output	1 bit	C - W - U	Low
181	Output A	Always response switch state	1 bit	C R - T -	Low
182	Output A	R/W statistic for time	2 Byte	C R W T U	Low
183	Output A	Alarm statistic for time out	1 bit	C R - T -	Low
184	Output A	Staircase light	1 bit	C - W - U	Low
185	Output A	Change staircase lighting time	2 Byte	C - W - U	Low
186	Output A	Alarm staircase lighting	1 bit	C R - T -	Low
187	Relay A	R/W statistic for counter	4 Byte	C R W T U	Low

NO.	Function	Object name	Data type	Flags
180, 190..	**Channel output**	**Output N**	**DPT 1.001 1 bit**	**C W U**

These communication objects of the channel output used for ON/OFF an channel, the switch output ON when the object receive the value is "1". the switch output OFF when the object receive the value is "0"

NO.	Function	Object name	Data type	Flags
181, 191..	**Always response switch state or Response state after change**	**Output N**	**DPT 1.001 1 bit**	**C R T**

This communication object used response the channel N status, If channel status is ON, then the response status value is "1", Otherwise the status value is "0"

NO.	Function	Object name	Data type	Flags
182, 192..	**Read/Write statistic for time**	**Output N**	**DPT 7.007 2 byte**	**C R W T U**

This communication object is used for statistics ON time of the channel "N". it can be read/wrote via bus by setting this function activity

NO.	Function	Object name	Data type	Flags
183, 193..	**Alarm statistic for time out**	**Output N**	**DPT 1.005 1 bit**	**C R T**

This communication object is used for statistic alarm when ON time out set range.

NO.	Function	Object name	Data type	Flags
184, 194..	**Staircase light**	**Output N**	**DPT 1.001 1 bit**	**C W U**

This communication object is used for start or stop staircase light

NO.	Function	Object name	Data type	Flags
185, 195..	**Change staircase lighting time**	**Output N**	**DPT 7.005 2 byte**	**C W U**

This communication object is used to modify the staircase lighting running time. Allow modify staircase lighting time via bus by setting this function activity.

| NO.	Function	Object name	Data type	Flags
186, 196..	**Alarm staircase lighting**	**Output A**	**DPT 1.005 1 bit**	**C R T**

This communication object is used to alarm the staircase lighting. If the function is actived, the staircase lighting start or stop, the communication object will alarm via bus. channel "N" is ON alarm "1", Otherwise alarm "0".

NO.	Function	Object name	Data type	Flags
187, 197..	**R/W statistic for counter**	**Relay N**	**DPT 12.001 4 byte**	**C R W T U**

This communication object is used for statistics ON counter of the channel "N". it can be read/write via bus by setting this function activity
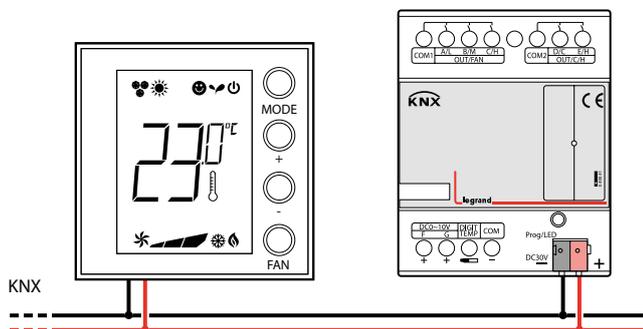
5. APPLICATION

■ 5.1 Program functions diagram
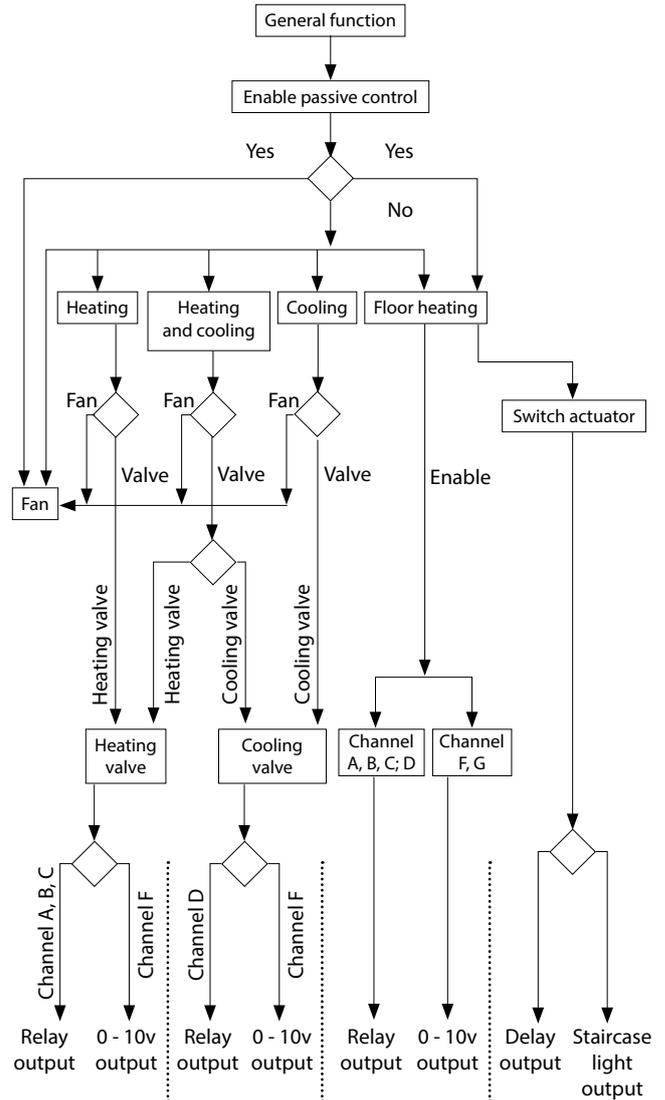
5. APPLICATION (continued)

■ 5.2 Room thermostat with the Fan Coil Controller

The setpoint temperature, HVAC mode, fan speed and the toggling of the HVAC control mode are carried out via an KNX operator panel (used the HVAC mode), it also can be monitoring the actual temperature to display.

■ 5.3 Room thermostat with the floor heating

The setpoint temperature, and the toggling of the operation are carried out via an KNX operator panel (used the floor heating mode), it also can be monitoring the actual temperature to display .

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